

ASG-Insight™ User's Guide

Version 7.0

Publication Number: INX0200-70

Publication Date: February 2003

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Preface

This *ASG-Insight User's Guide* provides instruction for using ASG-Insight (herein called Insight). Insight is a powerful interactive system that helps programmers by automating the process of analyzing COBOL programs.

Allen Systems Group, Inc. (ASG) provides professional support to resolve any questions or concerns regarding the installation or use of any ASG product. Telephone technical support is available around the world, 24 hours a day, 7 days a week.

ASG welcomes your comments, as a preferred or prospective customer, on this publication or on any ASG product.

About this Publication

This publication consists of these chapters:

- [Chapter 1, "Introduction,"](#) provides an overview of the Existing Systems Workbench (ESW) and Insight benefits.
- [Chapter 2, "Product Overview,"](#) describes the Insight interface and concepts.
- [Chapter 3, "Getting Started with Insight,"](#) describes for a new user how to invoke Insight, customize user options, allocate an Application Knowledge Repository (AKR), and analyze a program.
- [Chapter 4, "Program Understanding and Maintenance Techniques,"](#) describes how to use Insight to gain program understanding and perform maintenance.

Related Publications

The documentation library for ASG-Insight consists of these publications (where *nn* represents the product version number):

- *ASG-Center Installation Guide* (CNX0300-*nn*) contains installation and maintenance information for ASG-Center, the common set of libraries shared by the ASG-Existing Systems Workbench (ESW) suite of products.
- *ASG-ESW Enhancement Summary* (ESW1000-*nn*) highlights the new functionality for this release.
- *ASG-Insight Installation Guide* (INX0300-*nn*) provides instruction about the installation and maintenance of ASG-Insight.
- *ASG-Insight Quick Reference Card* (INX0900-*nn*) provides a summary of the commands and functions within ASG-Insight.
- *ASG-Insight Quick Reference Guide* (INX0600-*nn*) summarizes the syntax and use of ASG-Insight commands.
- *ASG-Insight Reference Guide* (INX0400-*nn*) provides detailed information about the pop-ups, screens, and commands used in ASG-Insight, including field descriptions, usage notes, and command syntax.
- *ASG-Insight User's Guide* (INX0200-*nn*) provides user information for ASG-Insight.

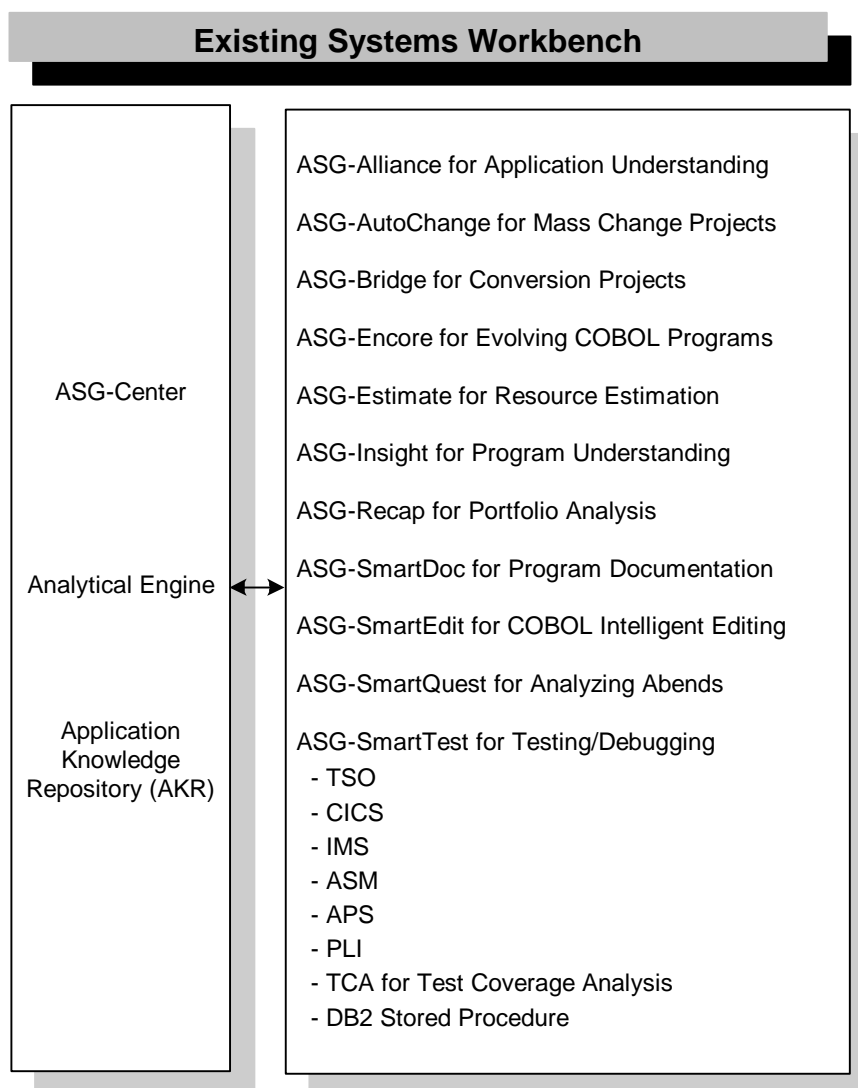
Note: _____

To obtain a specific version of a publication, contact ASG Customer Support.

ASG-Existing Systems Workbench (ASG-ESW)

ASG-ESW (herein called ESW) is an integrated suite of components designed to assist organizations in enhancing, redeveloping, or re-engineering their existing systems. ESW products use the Application Knowledge Repository (AKR) to store source program analysis information generated by the Analytical Engine. [Figure 1](#) represents the components of ESW.

Figure 1 • ASG Existing Systems Workbench



This table contains the name and description of each ESW component:

ESW Product	Herein Called	Description
ASG-Alliance	Alliance	The application understanding component that is used by IT professionals to conduct an analysis of every application in their environment. Alliance supports the analysis and assessment of the impact of change requests upon an entire application. Alliance allows the programmer/analyst to accurately perform application analysis tasks in a fraction of the time it would take to perform these tasks without an automated analysis tool. The impact analysis from Alliance provides application management with additional information for use in determining the resources required for application changes.
ASG-AutoChange	AutoChange	The COBOL code change tool that makes conversion teams more productive by enabling quick and safe changes to be made to large quantities of code. AutoChange is an interactive tool that guides the user through the process of making source code changes.
ASG-Bridge	Bridge	The bridging product that enables field expansion for program source code, without being required to simultaneously expand the fields in files or databases. Because programs are converted in smaller groups, or on a one-by-one basis, and do not require file conversion, testing during the conversion process is simpler and more thorough.
ASG-Center	Center	The common platform for all ESW products. Center provides the common Analytical Engine to analyze the source program and store this information in the AKR. This common platform provides a homogeneous environment for all ESW products to work synergistically.

ESW Product	Herein Called	Description
ASG-Encore	Encore	The program re-engineering component for COBOL programs. Encore includes analysis facilities and allows you to extract code based on the most frequently used re-engineering criteria. The code generation facilities allow you to use the results of the extract to generate a standalone program, a callable module, a complement module, and a CICS server. Prior to code generation, you can view and modify the extracted Logic Segment using the COBOL editor.
ASG-Estimate	Estimate	The resource estimation tool that enables the user to define the scope, determine the impact, and estimate the cost of code conversion for COBOL, Assembler, and PL/I programs. Estimate locates selected data items across an application and determines how they are used (moves, arithmetic operations, and compares). Time and cost factors are applied to these counts, generating cost and personnel resource estimates.
ASG-Insight	Insight	The program understanding component for COBOL programs. Insight allows programmers to expose program structure, identify data flow, find program anomalies, and trace logic paths. It also has automated procedures to assist in debugging program abends, changing a computation, and resolving incorrect program output values.
ASG-Recap	Recap	The portfolio analysis component that evaluates COBOL applications. Recap reports provide function point analysis and metrics information, program quality assessments, intra-application and inter-application comparisons and summaries, and historical reporting of function point and metrics information. The portfolio analysis information can also be viewed interactively or exported to a database, spreadsheet, or graphics package.
ASG-SmartDoc	SmartDoc	The program documentation component for COBOL programs. SmartDoc reports contain control and data flow information, an annotated source listing, structure charts, program summary reports, exception reports for program anomalies, and software metrics.

ESW Product	Herein Called	Description
ASG-SmartEdit	SmartEdit	The COBOL editing component that can be activated automatically when the ISPF/PDF Editor is invoked. SmartEdit provides comprehensive searching, inline copybook display, and syntax checking. SmartEdit allows you to include an additional preprocessor (for example, the APS generator) during syntax checking. SmartEdit supports all versions of IBM COBOL, CICS, SQL, and CA-IDMS.
ASG-SmartQuest	SmartQuest	The diagnostic tool for analyzing batch and CICS transaction abends. SmartQuest has been designed to make the maximum use of simple point-and-shoot techniques to enable fast and easy navigation through any data dump.
ASG-SmartTest	SmartTest	The testing/debugging component for COBOL, PL/I, Assembler, and APS programs in the TSO, MVS Batch, CICS (including file services), and IMS environments. SmartTest features include program analysis commands, execution control, intelligent breakpoints, test coverage, pseudo code with COBOL source update, batch connect, disassembled object code support, and full screen memory display.

Invoking ESW Products

The method you use to invoke an ESW product depends on your system setup. If you need assistance to activate a product, see your systems administrator. If your site starts a product directly, use the ISPF selection or CLIST as indicated by your systems administrator. If your site uses the ESW screen to start a product, initiate the ESW screen using the ISPF selection or CLIST as indicated by your systems administrator and then typing in the product command on the command line.

The product names can also vary depending on whether you access a product directly or through ESW. See ["ESW Product Integration" on page xi](#) for more information about using ESW.

To initialize ESW products from the main ESW screen, select the appropriate option on the action bar pull-downs or type the product shortcut on the command line.

Product Name (ESW Name)	Shortcut	ESW Pull-down Options
Alliance (Application Understanding)	AL	Understand ► Application
AutoChange (Conversion Set)	CC	Change ► Conversion Set
Bridge	BR	Change ► ASG-Bridge
Encore (Program Re-engineering)	EN	Re-engineer ► Program
Estimate	ES	Measure ► ASG-Estimate
Insight (Program Understanding)	IN	Understand ► Program
Recap (Portfolio Analysis)	RC	Measure ► Portfolio
SmartDoc (Program Documentation)	DC	Document ► Program
SmartEdit	SE	Change ► Program Or Change ► Program with Options
SmartQuest	SQV	Understand ► Abend/Dump
SmartTest (Testing/Debugging)	ST	Test ► Module/Transaction

ESW Product Integration

Because ESW is an integrated suite of products, you are able to access individual ESW products directly, or through the main ESW screen. As a result, different fields, values, action bar options, and pull-down options display on a screen or pop-up depending on how you accessed the screen or pop-up.

Certain ESW products also contain functionality that interfaces with other ESW products. Using SmartTest as an example, if Alliance is installed, SmartTest provides a dynamic link to Alliance that can be used to display program analysis information. If Insight is installed and specified during the analyze, the Insight program analysis functions are automatically available for viewing logic/data relationships and execution path. For example, the Scratchpad option is available on the Options pull-down if you have Insight installed.

Figure 3 shows the Encore Primary screen that displays when you access Encore through ESW by selecting Re-engineer ► Program from the ESW action bar menu. Notice that the Primary screen name changes to ASG-ESW - Program Re-engineering when you enter Encore through ESW. Also, the Logic menu item displays if Insight is installed.

Figure 3 • ESW Encore Primary Screen

[illegible]

Example 2

[Figure 4](#) shows the File - Analyze Submit pop-up that displays when you access SmartTest directly. [Figure 5 on page xiv](#) shows the File - Analyze Submit pop-up that displays when you access SmartTest through ESW.

Figure 4 • File - Analyze Submit Screen

```

                                File - Analyze Submit
Command ===> _____

                E - Edit JCL                                S - Submit JCL

Compile and link JCL (PDS or sequential):
Data set name  _____

Analyze features (Y/N):
ASG-SmartTest: Y   Extended Analysis: N

AKR data set name _____
AKR program name  NEWDEMO                (if overriding PROGRAM-ID)

Analyze options:
_____
_____
_____

Compile? (Y/N) . . . . . Y   (Y if needed by features)
Link load module reusable? (Y/N) Y

```

The actions shown on these screens can also vary. For example, the D - Doc Options action is only available on the File Prepare Program screen (or File - Analyze Submit screen) if SmartDoc is installed on your system. In [Figure 4 on page xiii](#), the ASG-SmartDoc Options action is not displayed.

Figure 5 • ASG-ESW - Prepare Program Screen (accessed through ESW)

```

                                ASG-ESW - Prepare Program
Command ==> -----
                E - Edit JCL      S - Submit JCL      D - Doc Options

Compile and link JCL (PDS or sequential):
Data set name -----

Analyze features (Y/N):
  Understand: N  Test: Y  Extended Analysis: N  Document: N
  Re-engineer: N  Abend/Dump: N
AKR data set name -----
AKR program name  NEUDEMO ----- (if overriding PROGRAM-ID)

Analyze options:
-----
-----

Compile? (Y/N) . . . . . Y      (Y if needed by features)
Link load module reusable? (Y/N) Y      (Test and Abend/Dump only)

```

Notice that the Analyze features field in [Figure 5](#) lists additional ESW products than shown on [Figure 4 on page xiii](#). This field is automatically customized to contain the ESW products you have installed on your system. These are the names of the analyze types:

Analyze Type	Analyze Type (ESW)
ASG-Encore	Re-engineer
ASG-Insight	Understand
ASG-SmartDoc	Document
ASG-SmartQuest	Abend/Dump
ASG-SmartTest	Test
Extended Analysis (ASG-SmartTest with Insight installed)	Extended Analysis

Publication Conventions

ASG uses these conventions in technical publications:

Convention	Represents
ALL CAPITALS	Directory, path, file, dataset, member, database, program, command, and parameter names.
Initial Capitals on Each Word	Window, field, field group, check box, button, panel (or screen), option names, and names of keys. A plus sign (+) is inserted for key combinations (e.g., Alt+Tab).
<i>lowercase italic monospace</i>	Information that you provide according to your particular situation. For example, you would replace <i>filename</i> with the actual name of the file.
Monospace	Characters you must type exactly as they are shown. Code, JCL, file listings, or command/statement syntax. Also used for denoting brief examples in a paragraph.
Vertical Separator Bar () with underline	Options available with the default value underlined (e.g., Y <u>N</u>).
<u>Underline</u>	Denotes a cursor-selectable field or line.

ASG Customer Support

ASG provides support throughout the world to resolve questions or problems regarding installation, operation, or use of our products. We provide all levels of support during normal business hours and emergency support during non-business hours.

ASG Third-party Support. ASG provides software products that run in a number of third-party vendor environments. Support for all non-ASG products is the responsibility of the respective vendor. In the event a vendor discontinues support for a hardware and/or software product, ASG cannot be held responsible for problems arising from the use of that unsupported version.

Intelligent Support Portal (ISP)

Online product support is available at: <http://www.asg.com/support/support.asp> via the ASG Intelligent Support Portal (ISP). Your logon information for ISP online support is:

Customer ID = NNNNNNNNNN

Password = XXXXXXXXXXXX

where:

NNNNNNNNNN is your customer ID supplied by ASG Product Distribution.

XXXXXXXXXX is your unique password supplied by ASG Product Distribution.

The *ASG-Intelligent Support Portal User's Guide* provides instructions on how to use the ISP and is located on the ASG Support web page.

Telephone Support

To expedite response time, please have this information ready:

- Product name, version number, and release number
- List of any fixes currently applied
- Any alphanumeric error codes or messages written precisely as displayed
- A description of the specific steps that immediately preceded the problem
- Verify whether you received an ASG Service Pack or cumulative service tape for this product. It may include information to help you resolve questions regarding installation of this ASG product. The Service Pack instructions are in a text file on the distribution media included with the Service Pack. You can access the latest software corrections and Service Packs via the ISP.
- The severity code (ASG Customer Support uses an escalated severity system to prioritize service to our clients. The severity codes and their meanings are listed below.)

Severity Codes and Expected Support Response Times

Severity	Meaning	Expected Support Response Time
1	Production down, critical situation	Within 30 minutes
2	Major component of product disabled	Within 2 hours
3	Problem with the product, but customer has work-around solution	Within 4 hours
4	"How-to" questions and enhancement requests	Within 4 hours

The Americas

	Phone	Fax	E-mail
United States and Canada	800.354.3578	1.703.464.4901	support@asg.com

Europe, Middle East, and Africa (EMEA)

During normal business hours, we recommend that you call the Central Support number first (except in South Africa).

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French	33.141.028590	33.141.028589	support.fr@asg.com
German	49.89.45716.200	49.89.45716.400	support.de@asg.com
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Submit all product and documentation suggestions to ASG's product management team at <http://www.asg.com/asp/emailproductsuggestions.asp>.

If you do not have access to the web, FAX your suggestions to product management at (239) 263-3692. Please include your name, company, work phone, e-mail ID, and the name of the ASG product you are using. For documentation suggestions include the publication number located on the publication's front cover.

1

Introduction

This chapter introduces Insight and contains these sections:

Section	Page
Introduction	1
Insight Overview	1
Benefits	2

Introduction

Insight is the Program Understanding component of ESW for COBOL programs. Insight allows programmers to expose program structure, identify data flow, find program anomalies, and trace logic paths. It also has automated procedures to assist you with debugging program abends, changing a computation, and resolving incorrect program output values.

Insight Overview

Insight is the first online technology that analyzes COBOL programs using IBM's TSO/ISPF interface. It is an electronic window through which you gain insight into the workings of a COBOL program.

Insight features Common User Access (CUA) screens, pull-downs, and pop-ups that are designed to provide easy access to all of the product features.

An action bar is the line of keywords displayed at the top of a screen. Each keyword represents a category of actions that you can perform on that screen. To view the list of actions on a pull-down, move the cursor to the desired keyword and press Enter. To make a selection, type the number that corresponds to the desired action and press Enter. The result may be a generated command or a pop-up.

A pop-up is a window that displays on your screen and allows you to enter information for the requested action. Type the desired data and options and press Enter to execute the desired action.

See ["CUA Interface" on page 6](#) for more information.

Powerful Insight facilities provide a precise, consistent, and thorough analysis of COBOL source code. You no longer need to summarize information from source listings, cross-references, and primitive online browse facilities. Each task is automated, yet blends with your current maintenance practices. You can determine what information you want and when you want it. You can also direct whether an overview or the details of a program are displayed. Insight reduces the time spent understanding programs by half.

Benefits

Insight offers COBOL programmers unprecedented speed and accuracy while analyzing source code.

You can get an overview of either structured or unstructured programs with Insight's flexible options. Insight also offers you online access to cross-referenced data, either by selecting an option on an action bar or by using a single command. Its references include automatic checks for group level and redefined datanames. In addition, Insight retains the results for further evaluation with other commands.

Insight reduces effort, eliminates oversights, and saves time.

Efficiency. You save time because you do not manually collect information from limited listings and browse facilities. Use an action bar selection or command to evaluate your program and Insight presents you with concise results.

Accuracy. The Insight analysis is accurate. It consistently and precisely evaluates COBOL source code.

Usability. The easy to use CUA screens, pull-downs, and pop-ups featured in Insight eliminate your need to search and summarize program listings. Insight displays summarized results in screen formats that prepare you for your next query.

Accessibility. Insight is at your fingertips. It is integrated into your daily TSO/ISPF work environment and supplies useful help facilities.

Focus. Insight manages technical details so you can focus on understanding programs and assessing your changes.

Understandability. Insight pull-downs, pop-ups, and commands help to automate each task you need to perform in order to learn a program. COBOL program characteristics are easily revealed through pop-ups or Insight commands. Insight presents the resulting analysis clearly, when and where you need it.

Insight offers these five features to help you through the understanding process:

- Determining program structure
- Identifying data usage and relationships
- Tracing data usage in logic
- Tracing logic flow
- Saving, reusing, and printing information

2

Product Overview

This chapter discusses components of the Insight product, and contains these sections:

Section	Page
Major Components of Insight	5
CUA Interface	6
Concepts	11

Major Components of Insight

The Insight system consists of these major components:

- Program analyzer (Batch)
- Application Knowledge Repository (AKR)
- Source view, Tree view, and Structure view
- Search and logic facilities
- Automated program maintenance task facility

CUA Interface

Insight features CUA (Common User Access) screens, pull-downs, and pop-ups that give you easy access to all of the product features.

An action bar is the line of keywords that displays at the top of a screen. Each keyword represents a category of actions that you can perform on that screen. Process the action bar by selecting an action. Select an action by moving the cursor to the desired keyword and pressing Enter.

A pull-down is the list that displays when you select an action on the action bar. On a pull-down, actions followed by... displays a pop-up when selected. Actions not followed by ... immediately activate internal commands. Select pull-down items one of these ways:

- Move the cursor to the desired keyword and press Enter
- Type the number of the desired action in the input field and press Enter.

A pop-up is a window that displays when you select an item on a pull-down, a pop-up, or you enter certain commands. It displays on your screen to allow you to enter information for the requested action. Enter the desired data and/or option, and then follow the instructions on the pop-up to process the information.

Note: _____

Use the END command (default PF03/15) to exit a pull-down or pop-up without processing any actions. If the cursor is on the action bar when you press PF03/15, the cursor will move to the command input area of the screen.

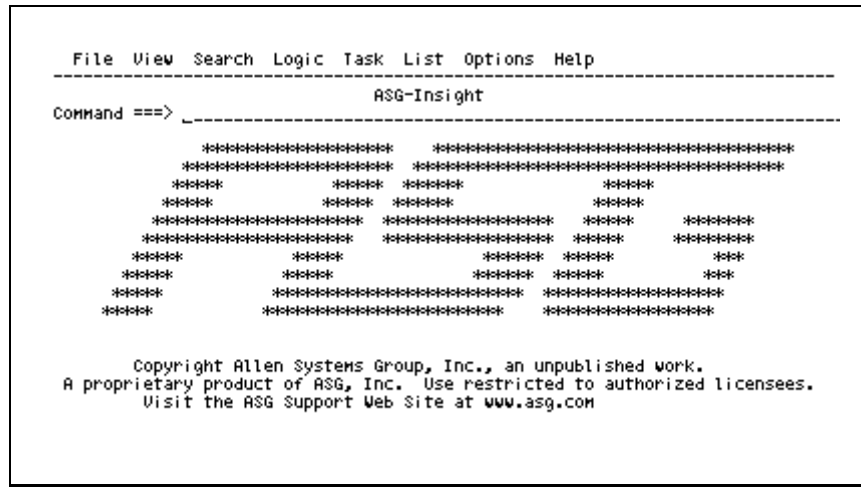
The Action Bar

The Action bar displays on all Insight screens. On a few pop-ups, a shortened action bar displays. The shortened action bar contains fewer actions than the regular action bar, and some of the pull-downs on the shortened action bar contain fewer actions.

Select an action by moving the cursor with the tab or arrow keys to the desired keyword and pressing Enter. If the cursor is on the action bar when you press PF03/15, the cursor will move to the command input area of the screen. If the cursor is on a full screen, pressing HOME moves the cursor to the first action on the action bar.

[Figure 6](#) shows the action bar on the primary Insight screen, which is the first screen displayed upon entry into Insight.

Figure 6 • Action Bar Format (Primary Insight Screen)



Actions

Action	Description
File	Displays the File pull-down used to open, close, edit, and save programs; analyze programs prior to use by Insight; manage the AKR; execute script files; and exit Insight.
View	Displays the View pull-down used to select the method to be used to view a program, view paragraph cross-reference information, view program information, display or exclude source according to the hierarchical structure, change the level of information viewed, reset the display, and exclude lines from the display.
Search	Displays the Search pull-down used to conduct a COBOL intelligent search of the source code for one or all occurrences of a specified target and to find, highlight, scroll, print, punch, or exclude the results.
Logic	Displays the Logic pull-down used to follow the execution of a program, searching for a specified target.
Task	Displays the Task pull-down used to automate maintenance tasks, such as modifying program output and computations or debugging a program abend.
List	Displays the List pull-down used to list information about CALLSs, EQUATEs, MARKs, PERFORMs, programs, and subsets.

Action	Description
Options	Displays the Options pull-down used to customize your Insight environment by setting certain parameters and options, defining PF keys, and so forth.
Help	Displays the Help pull-down used to access the online help facility.

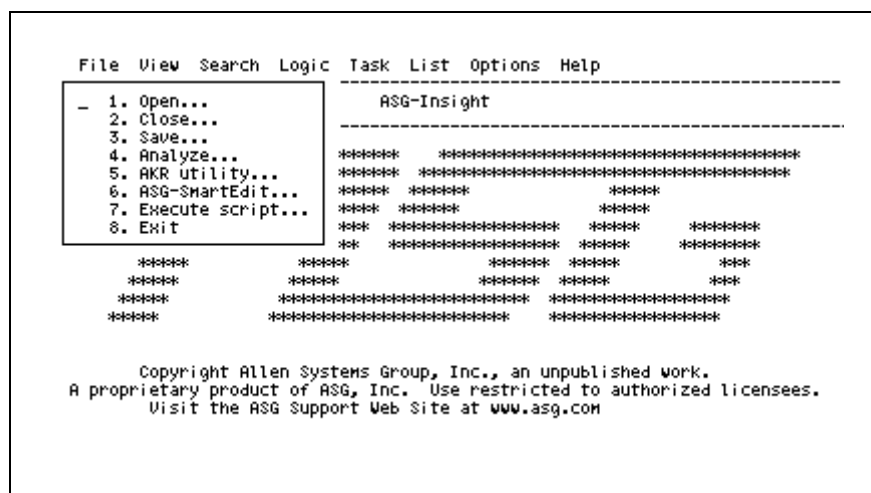
Pull-downs

A pull-down displays in a window when you select an action on the action bar (see [Figure 7](#)). Two types of actions are available on pull-downs: an action followed by ellipsis (...) displays a pop-up when selected; an action not followed by ... immediately activates the requested action and usually redisplay the previous screen.

There are two ways to select an item on a pull-down:

- Move the cursor to the desired keyword and press Enter
- Type the number of the desired action in the input field and press Enter.

Figure 7 • Pull-down Format



On the File pull-down, all of the actions except Exit display a pop-up when selected.

Note:

Use the END command or PF03/15 to exit a pull-down without processing any actions.

Pop-ups

A pop-up is a window that displays when you select an item on a pull-down, a pop-up, or when you enter certain commands. A pop-up is superimposed over a screen, has a border, and usually does not have an action bar. A pop-up can contain one or more fields.

Follow the instructions on the pop-up to process the information. Use the END command (default PF03/15) to exit from a pop-up without processing it.

Pop-ups have two types of fields: entry fields and selection fields. Entry fields are used to type textual information and selection fields are used to select one or more choices.

[Figure 8](#) shows the Search - Data Name pop-up.

Figure 8 • Pop-up Example (Search - Data Name Pop-up)

```

File View Search Logic Task List Options Help
-
C      Search - Data Name
Type a data name and select search options. Then press Enter. For
* a selection list, enter a pattern (e.g. ABC*) in the name area.
0
0      Data name _-----
0
0 References                Indirect impact          Size change
0 1   1. All                 1   1. None              levels . . . ---
0     2. Defs                2. Of size change
0     3. Uses                 3. Of value change
0     4. Mods
0
0 Direction                Options                    Action
0 1   1. All                  - No data aliasing    1   1. Find
0     2. Next                 - IN-clause...        2. Highlight
0     3. Previous              3. Scroll
0     4. First                 4. Print
0     5. Last                   5. Punch
0                                6. Exclude
0
000018 *      IN ITS SKELETAL FORM, THIS EXIT COPIES THE INPUT

```

Entry Fields. Text entry fields are used to enter textual information, such as a dataname, line range, number of levels, etc. The length of each text entry field is designated by an underline. In the [Figure 8](#), Data Name is an example of a text entry field.

Selection Fields. Numbered selection fields allow you to select one item from a list. Type the number of the desired selection in the field input area to the left of the first numbered item.

Select unnumbered selection fields by entering a slash (/) in the field input area. To unselect a selection field, enter a blank space to remove the slash.

The field input area is designated by an underline. When a pop-up first displays, each field contains its default value. On some pop-ups, if you change the default Insight retains the new value for subsequent sessions.

In [Figure 8 on page 9](#), Direction is an example of a numbered selection field. No Data Aliasing is an example of an unnumbered selection field.

Note:

Use the END command or PF03/15 to exit from a pop-up without processing it.

Screens

A screen is a full-width display of information, containing a full action bar as the first line. Insight screens are modeled after the TSO/ISPF/PDF edit screen, to which CUA features have been added.

[Figure 9](#) shows the Source View screen. Each field or area is described below.

Figure 9 • Insight Screen Sample

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEM0
Command ==>                               Scroll ==> PAGE
ASG1679I 3 TARGET STATEMENTS FOUND
-----
000283      CALL 'VIAIDEM1' USING MASTER-IN      282 LINES NOT DISPLAYED
000284      MASTER-END-OF-FILE                    TARGET
000285      MASTER-REPORT-DATE.
-----
000353      MOVE LOAN-START-DATE TO DET-START-DATE.  67 LINES NOT DISPLAYED
000354      WRITE MAST-RPT FROM DETAIL-LINE1.      I/TGT-U:
-----
000405      READ MASTERIN                        50 LINES NOT DISPLAYED
-----
***** BOTTOM OF DATA *****

```

(A) The action bar displays at the top of every screen. See ["The Action Bar" on page 6](#) for more information.

(B) The name of the screen.

(C) The name of the active program. If there is no open program, this field is not displayed. This area of the screen is also used to temporarily display error and informational messages.

(D) The command input area. Insight primary commands are entered here.

(E) SCROLL specifies the number of screen lines or columns to scroll. This field is omitted from screens that can not be scrolled, such as the primary screen. You can enter these values:

Value	Description
1 through 9999	Specifies a number from 1 through 9999 to enter the number of lines or columns to scroll.
CSR	Specifies a scroll value of one page from the current cursor location.
HALF	Specifies a scroll value of a half page.
MAX	Specifies that the top, bottom, right, or left margin is the scroll value.
PAGE	Specifies a scroll value of one page.
DATA	Specifies a scroll value of one line less than a page.

(F) The long message field displays more descriptive error and informational messages. A long message displays if there is no corresponding short message, or if you enter HELP while a short message is shown.

Concepts

Insight is a powerful, easy-to-use system that helps programmers analyze and understand COBOL programs faster and more accurately. This section introduces some concepts and terms that are key to the operation of Insight.

Screen Messages

Insight messages are displayed in the long message area on the screen as described above. Short messages are displayed when available. Long messages are displayed if a short message does not exist or when you request help immediately following a displayed short message. You can enter the HELP command with the message number to display an explanation and any actions for the message.

Note: _____

See the Help Facility chapter in the *ASG-Insight Reference Guide* for additional information.

Analyze Job (Batch)

Insight analyzes COBOL programs using the Analyze job. The Analyze job produces a detailed program analysis that includes this information:

- Program organization and structure
- Data relationships
- Paths of modification and usage for all data fields
- Logic and control flow between modules, paragraphs, and statements

The analysis is saved in the AKR.

The Analyze job technology is similar to an optimizing compiler. The major difference is that you can use Insight to access the information saved in the AKR.

Note: _____

For more information, see the Analyze chapter in the *ASG-Insight Reference Guide*.

Application Knowledge Repository (AKR)

The AKR holds all the information the Analyze job produced about an application program. Access this information by using one of the View methods.

The AKR is a BDAM or VSAM file organization. A single AKR can store many programs, and you can define more than one AKR. To define new AKRs and to expand existing AKRs, use the online or Batch AKR utilities provided by Insight

Note: _____

For more information, see the AKR Utilities chapter in the *ASG-Insight Reference Guide*.

Sets

A set is a grouping of source lines in a COBOL source program. Sets consist of subsets, mark name sets, and line range sets. For more information on mark name sets and line range set, see ["Targets" on page 16](#). Many Insight commands use one or more of these sets or subsets. To concatenate sets, place a plus sign (+) between them.

Subsets

There are three types of subsets: COBOL language subsets, screen subsets, and tagged lines subsets. To show each subset, either select the Subsets action on the List pull-down or type LIST SUBSETS to display the List - COBOL Subset Names pop-up.

COBOL Subsets

Insight classifies COBOL statements into subsets by grouping COBOL verbs of a similar nature together. For example, you could refer to any lines that contain READ, WRITE, OPEN, or CLOSE verbs, by using the COBOL language subset name IO.

For a complete list of the verbs included in each of the COBOL subset names, select the Subsets action on the List pull-down or type `LIST SUBSETS` to display the Subsets List screen. This table describes each of the COBOL subsets and the entities to which they correspond.

COBOL Subset	Description
ASsignment	Statements that assign a value to a data item; e.g., MOVE, ADD, or COMPUTE.
CALL	Statements related to subprogram calls such as CALL and CANCEL.
CIcs	Any CICS (Customer Information Control System) or DL/I Command Level commands.
COBOLII	COBOL II, including CONTINUE, END, and INITIALIZE verbs.
COBOL/370	Statements and clauses unique to COBOL/370, such as intrinsic function calls, procedure pointers, and calls to LE/370 run-time environment.
COMment	Statements having no run-time effect such as all lines with an asterisk (*) in column 7, the entire IDENTIFICATION DIVISION, and NOTE statements.
CONditional	Statements or parts of statements that conditionally change the flow of control in a program such as IF, ELSE, and WHEN.
COPy	COPY, COPY IDMS, SQL INCLUDE, ++INCLUDE, -INC statements.
DB2 SQL	EXEC SQL statements.
DDL	SQL Data Definition Language statements, such as CREATE, ALTER, DECLARE, and DROP.
DEAD	Statements containing dead code and dead data.
DEADCode	Statements containing code that cannot be executed under any conditions.
DEADData	DATA DIVISION statements containing datanames and their aliases that are not referenced in the PROCEDURE DIVISION.

COBOL Subset	Description
DEBug	Statements containing a DEBUG, EXHIBIT, ON, READY, or RESET verb, as well as statements containing a D in column 7.
DEFinition	Declaratives of data items including the SPECIAL-NAMES paragraph in the ENVIRONMENT DIVISION as well as the entire DATA DIVISION.
DIRECTive	Statements that direct the compiler to take specific actions during compilation such as BASIS, EJECT, and TITLE.
DL/I DL/1	EXEC DL/I commands, such as ENTRY 'DLITCBL' or CALL 'CBLTDLI'.
DML	SQL Data Manipulation Language statements, such as SELECT, UPDATE, INSERT.
ENtry	The PROCEDURE DIVISION statement and all ENTRY statements.
EXIt_PGMExit	Statements containing a STOP RUN, GOBACK, or EXIT PROGRAM verb as well as CALL statements that are indicated as NORET (non-returning).
FALLthrough	Statements of PERFORMed paragraphs or units that fall through to the next paragraph.
GOto	Statements containing an ALTER or GOTO verb.
IDMS	IDMS statements.
INClude	COPY, COPY IDMS, SQL INCLUDE, ++INCLUDE, -INC statements.
INPUTOutput IO Input Output	COBOL IO statements (IO, Input, or Output) including CALL statements that are indicated as containing IO, Input, or Output.
LABel DIVision PARagraph SECTion	Statements containing DIVISION or SECTION headers, or PARAGRAPH labels. LABEL refers to the PROCEDURE DIVISION line and all section and paragraph names in the PROCEDURE DIVISION.
MAINline	Mainline code statements that are reachable from the PROCEDURE DIVISION line to the program units by following FALLTHROUGHS and GO TOs, but not PERFORMs.

COBOL Subset	Description
MATH	Statements containing ADD, SUBTRACT, MULTIPLY, DIVIDE, or COMPUTE verbs.
PERform	Statements containing the PERFORM, SORT, or MERGE verbs.
RETurn	Statements of a PERFORMed paragraph ranges that return control.
SORTMerge	Statements containing SORT, MERGE, or RELEASE verbs; paragraph or section names referred to in INPUT/OUTPUT PROCEDURES.
TESted	Identifies the lines of code that have been tested, based on information created and updated using TCA Reports.
UNTested	Identifies the lines of code that have not been tested, based on information created and updated using TCA Reports.

Screen Subsets

Screen subsets are generally the result of an interactive command. To specify one of these subsets, enter the entire name, or at least the minimum abbreviation as indicated by the upper case letters:

Highlighted | HI
 NONHighlighted | NHI
 Excluded | X
 NONExcluded | NX

Tag Subsets

Tag subsets display in the right-most columns of the screen to provide you with immediate information about the source code. Insight uses tags to mark the results of commands and actions from pull-downs or pop-ups, and to mark data items that are never referenced, tag statements that contain dead code, tag program exits, and tell you if PERFORMed paragraphs fallthrough or return. Specific tags are provided for TRACE option information. These tags help you to trace through the code quickly and easily.

These tags are used as subsets in commands that accept subsets as targets:

Tag	Description
TAGged TAGS	Refers to all lines that have information tags on them.
DECision	Refers to a line where TRACE is waiting for a decision.
OPTions	Refers to lines which are the optional choices for the decision point of the trace.
STArt	Refers to a line where the flow or trace started.
TARGet TGT	Refers to a line containing the target for FLOW or TRACE commands.

Targets

A target is the object of an Insight primary command. Targets are defined in these categories:

- Mark name
- Line range
- Data name
- Perfrange name
- Label name
- Pattern string
- Subset name
- Program name
- Paragraph name

Mark Name

A mark name is any user-generated path or set of lines named with the COPY, MARK, MERGE, or RENAME command, one of the Utility - Scratchpad pop-ups, a system-generated path created by the FLOW or TRACE command, or one of the Logic Order Search pop-ups. These paths are NETWORK, SUBNET n , and TRACK.

Marks can be created, listed, renamed, copied, deleted, and merged with other Mark name sets. You may view all of the existing marks on the List - User Marks pop-up, or by typing LIST MARKS on the Source View screen, which displays the Marks List pop-up.

Perfrange Name

A perfrange name consists of all executable statements within a perform range, including all code that is executed by following that PERFORM. For example, the COBOL statement:

```
PERFORM PARAGRAPH-ABC THRU PARAGRAPH-XYZ
```

indicates that the range is comprised of the paragraphs beginning with PARAGRAPH-ABC and continuing through the end of paragraph PARAGRAPH-XYZ, including any paragraphs that are executed in between.

Note: _____

If a single paragraph is PERFORMed, see the paragraph name itself.

Program Name

A program name consists of all the code in all the divisions of the given program. For COBOL II Release 3 and above, the program name may refer to a nested subprogram.

Subset Name

A subset name is one of the previously described COBOL language subsets, screen subsets, or tag subsets.

Line Range

A line range can be a single line or a group of lines. Line ranges are specified by placing a hyphen (-) between the first and last line numbers in the range (e.g., 214 - 376). Line numbers are shown in the first six columns of the Source View screen.

Label Name

A label name is any paragraph or section name of the PROCEDURE DIVISION, as well as the literals PROCEDURE and PROC. Label name specifies all transfers of control to a paragraph or section.

Dataname

A dataname can be any of these types:

- Elementary dataname
- File name
- Group name
- Table name
- Table element name
- Special name

Specify any legal COBOL reference for a data element as a dataname. If a variable is redefined to another name, Insight searches for the specified variable name and the redefined name. Any reference to an entry in a table is treated as a reference to the entire table. When data items overlap so a name can refer to parts of multiple data items, searches are performed on each part and all references are reported. For example, if a group item is specified in a search command, references to the group item as well as the individual elements within the group are located. This is also true of modifications, uses, or references to the data item. Insight locates valid references to the variable item as opposed to simple pattern matching of the characters in the variable name. These references are called aliases.

Fully qualified datanames are specified by following them with a standard COBOL OF clause, followed by the group level dataname. For example:

DATA-NAME-ELEMENT OF DATA-NAME-GROUP

Locate multiple datanames at the same time by concatenating the datanames with a plus sign (+) between them. For example:

DATA-NAME1 + DATA-NAME2

Pattern String

A pattern string is a sequence of characters, surrounded by single or double quotes if it contains blanks. Specify strings of non-alphanumeric characters by the *X' string'*, *T' string'*, and *P' string'* operands. Further qualify the string using the WORD, PREFIX, or SUFFIX subordinate operands.

- *X' string'*
A hexadecimal string, enclosed in single or double quotes.
- *T' string'*
A text string, which disregards upper and lowercase, enclosed in single or double quotes.
- *P' string'*
A picture string, enclosed in single or double quotes. These are the valid picture strings:

P'='	Any character
P'¬'	Any nonblank character
P'.'	Any nondisplay character
P'#'	Any numeric character
P'-'	Any non-numeric character

P'@'	Any alphabetic character (upper or lowercase)
P'<'	Any lowercase alphabetic character
P'>'	Any uppercase alphabetic character
P'\$'	Any special character (not alphabetic or numeric)

- WORD

A string preceded and followed by any non-alphanumeric character (except hyphen).

- PREFIX

A word that begins with the specified string.

- SUFFIX

A word that ends with the specified string.

Paragraph Name

A paragraph name is any paragraph or section name of the PROCEDURE DIVISION, as well as the literals PROCEDURE and PROC. Paragraph name includes the entire paragraph or section.

3

Getting Started with Insight

This chapter discusses how to use Insight and contains these sections:

Section	Page
Introduction	21
Initiating an Insight Session	22
Defining User Options	23
Using an AKR	30
Using the Analyze Facility	33

Introduction

The steps necessary to invoke Insight vary by site. Check with the system administrator at your site for these details. Before following along with the sample Insight session presented, you may find it helpful to review Insight terminology, in the glossary of the *ASG-Insight Reference Guide*.

The first time you activate Insight, you must define some parameters. This chapter describes how to perform these functions:

- Invoke an Insight session
- Customize user options
- Allocate an AKR
- Analyze a program

Initiating an Insight Session

The method that you use to invoke Insight depends on your system setup. If you need assistance to activate Insight, see your systems administrator.

If your site starts Insight directly, use the ISPF selection or the CLIST as indicated by your systems administrator. After you activate the session, the Insight Primary screen displays, as shown in [Figure 10](#).

Figure 10 • Insight Primary Screen

[illegible]

If your site uses the ESW screen to start Insight, initiate the ESW screen by using the ISPF selection or the CLIST as indicated by your systems administrator.

To start Insight, follow this step:

- Select Understand ► Program. The Insight Primary screen, shown in [Figure 11](#), displays.

Figure 11 • Insight Primary Screen (when started from ESW)

[illegible]

Note: _____

When you start Insight from the ESW screen, the product name displays on the screens as ESW - Program Understanding.

Defining User Options

Upon your first entry to Insight, you should customize the options to reflect the appropriate settings for your environment. Some options are initially set to default values established during product installation by the systems programmer.

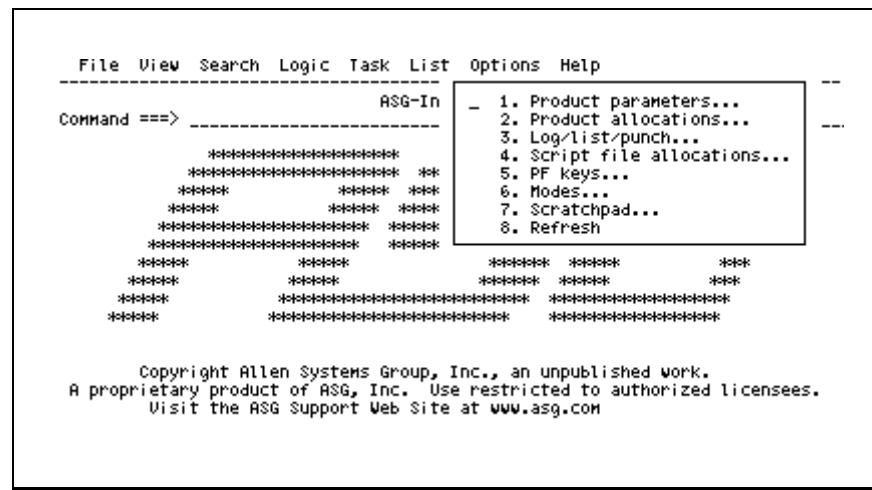
Use the Options pull-down to customize these Insight options:

- Set online operations parameters on the Parameters Definition pop-up
- Set the Log, List, Punch, and Work file allocations in the Allocation Definition pop-up
- Set Log, List, and Punch file processing options and provide a Job card on the Log/List/Punch Definition pop-up
- Set PF key values

To display the Options pull-down, follow this step:

- ▶ Select Options on the action bar and press Enter. The Options pull-down, shown in [Figure 12](#), displays.

Figure 12 • Options Pull-down Menu



Setting Online Operation Parameters

Use the Options - Parameter Definition pop-up to set and/or verify parameters affecting the online operation of Insight. This includes specifying where equates and marks are to be saved.

To set online operation parameters

- 1 Select Options ► Product Parameters and press Enter. The Options - Product Parameters, shown in [Figure 13](#), displays.

Figure 13 • Options - Product Parameters Pop-up

```

- File View Search Logic Task List Options Help
-
C Command ==> -----
Type the desired parameters below to customize the operation of
the product. Then press Enter.
Alarm . . . . . YES (Yes or No)
Save Equates . . . . YES (Yes or No)
Save Marks . . . . . YES (Yes or No)
Cursor character . . % (token substitution character)
***
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Visit the ASG Support Web Site at www.asg.com

```

- 2 Type the appropriate information in the fields and press Enter.
- 3 Press PF03/PF15 to return to the previous screen.

Allocating the Log, List, Punch, and Work Files

Use the Product Allocations pop-up to set and/or verify Direct Access Storage Device (DASD) information for the Log, List, Punch, and Work files. Some options may be initially set to default values established during product installation by the systems programmer.

To define the Log, List, Punch, and Work file allocations

- 1 Select Options ► Product allocations and press Enter. The Options - Product Allocations pop-up, shown in [Figure 14](#), displays.

Figure 14 • Options - Product Allocations Pop-up with SMS

Options - Product Allocations			
Command ==>			
Log file:			
Management Class	MGMT1	Generic unit . . .	SYSDA
Storage Class . .	STOR1	Volume serial . .	_____
List file:			
Management Class	MGMT1	Generic unit . . .	SYSDA
Storage Class . .	STOR1	Volume serial . .	_____
Punch file:			
Management Class	MGMT1	Generic unit . . .	SYSDA
Storage Class . .	STOR1	Volume serial . .	_____
Work file:			
Management Class	MGMT1	Generic unit . . .	SYSDA
Storage Class . .	STOR1	Volume serial . .	_____
Data Class	DATA1	Space units . . .	CYLS
		Primary space . .	1
		Secondary space	1

- 2 Type the appropriate information in the fields and press Enter.
- 3 Press PF03/PF15 to return to the previous screen.

Specifying Log/List/Punch Processing Options

Use the Options - Log/List/Punch Definition pop-up to define and set and/or verify processing values for the Insight Log, List, and Punch files. These files are used for system message logging, error handling, and holding the results of several Insight commands. Some options may be initially set to default values established by the systems programmer during product installation.

To specify the Log/List/Punch Definition options

- 1 Select Options ► Log/list/punch and press Enter. The Options - Log/List/Punch Definition pop-up, shown in [Figure 15](#), displays.

Figure 15 • Log/List/Punch Definition Pop-up

```

Options - Log/List/Punch Definition
Command ==> -----
1 - Process log file  2 - Process list file  3 - Process punch file
                   4 - Customized data set name

Options              Log              List              Punch
-----
Process option      . . . . . K          PK              PK
Primary tracks      . . . . . 1          1              1
Secondary tracks    . . . . . 2          5              5
Lines per page      . . . . . 56         56             56
Sysout class        . . . . . *          *              *

Process options: PK (print/keep), PD (print/delete), K, or D.

Job statement information:
//NAME JOB (ACCOUNT)NAME,
//  MSGCLASS=A
/*  INSERT 'ROUTE PRINT NODE.USER' HERE IF NEEDED.

```

- 2 Type the appropriate information in the fields and press Enter.
- 3 Press PF03/PF15 to return to the previous screen.

Note:

When the PK or PD option is specified, a valid job card must be specified in the JOB STATEMENT INFORMATION field prior to processing any Log, List, or Punch files.

Fields

Field	Description
File Naming	Specifies whether the Log, List, and Punch files are named by system default (S) or user-defined (U) dataset names.
Prompt later for DSN	<p>Enables you to define a custom name during processing. If you specify N, you must enter a dataset name in the corresponding Data set name field, and specify Overwrite or Append in the File Mode field.</p> <p>If you specify Y in the Prompt later for DSN field, Insight prompts you for the dataset name during file processing.</p>

Field	Description
Log Data set name List Data set name Punch Data set name	Indicates the name of the dataset in which the Log, List, or Punch files will be saved during processing.
File Mode	Specifies whether Log, List, and Punch files will overwrite or be appended to the existing files during processing.

To customize the Log, List, or Punch dataset name

If you specify K or PK process option, you can customize the dataset where the log, list, or punch file is allocated. By default, Insight allocates this Log, List, and Punch file name:

USERID.yyyynnnnn.VIAxxxxx

where:

yyy is the product ID.

nnnnn is a sequential number from 00001 to 99999.

xxxxx is LOG for Log, LIST for List, and PUNCH for Punch files.

If you have specified a TSO Prefix, the prefix will be appended to the beginning of the file name allocated for the Log, List, and Punch files.

- 1 From the Options - Log/List/Punch Definition pop-up, type 4 and press Enter. The Options - Log/List/Punch Name Customization pop-up, shown in [Figure 16](#), displays.

Figure 16 • Options - Log/List/Punch Name Customization Pop-up

```

Options - Log/List/Punch Name Customization
Command ==> -----
You can define a customized name when you choose option PK (print/keep) or
K (keep) by specifying U(ser). Specifying Y(es) on Prompt later lets you
define a custom name as you process each log/list/punch file. Otherwise,
specify data set name and file mode. Then press Enter.

Options          Log      List      Punch
-----
File Naming . . . . . U      U      S      U(ser) or S(ystem)
Prompt later for DSN . . Y      Y      -      Y(es) or N(o)

The following are needed if U(ser) and N(o) are specified above

Log Data set name ----- (Seq)
File Mode . . 0      0(verwrite) or A(ppend)
List Data set name ----- (Seq)
File Mode . . -      0(verwrite) or A(ppend)
Punch Data set name ----- (Seq)
File Mode . . -      0(verwrite) or A(ppend)

```


- 2 Type U in the File Naming field for Log, List, and/or Punch to indicate a user-defined dataset name. If you specify N in the Prompt later for DSN field, you must enter a dataset name in the corresponding Data set name field, and specify Overwrite or Append in the File Mode field.

If you specify Y in the Prompt later for DSN field, Insight prompts you for the dataset name during file processing. For example, if you specify Yes in the Prompt later for DSN field for the Log file, the Log Name Customization pop-up shown in [Figure 17](#) will be displayed.

Figure 17 • Log Name Customization Pop-up

```

Options - Log Name Customization
Command ==> _____

You can define a customized name when you choose option PK (print/keep) or
K (keep) by specifying U(ser). Specifying Y(es) on Prompt later lets you
define a custom name as you process each log file. Otherwise, specify
data set name and file mode. Then press Enter.

Options          Log
-----
File Naming . . . . . S      U(ser) or S(ystem)
Prompt later for DSN . . . _ Y(es) or N(o)

The following are needed if U(ser) and N(o) are specified above

Log Data set name _____ (Seq)
File Mode . . . _ O(verwrite) or A(ppend)
  
```

Mapping PF Key Values

To set your PF keys

- 1 Select Options ► PF keys and press Enter. The Options - PF Key Definition pop-up, shown in [Figure 18](#), displays.

Figure 18 • PF Key Definition Pop-up

```

Options - PF Key (01-12) Definition
Command ==> _____

Press Enter to process changes and/or to display alternate keys.
Press PF3/15 (END) to exit.

Number of PF keys: 24      Terminal type: 3276

PF01 HELP
PF02 SPLIT
PF03 END
PF04 RPREF
PF05 RFIND
PF06 FX %
PF07 UP
PF08 DOWN
PF09 SWAP
PF10 BRANCH
PF11 BRANCH BACKUP
PF12 RECALL
  
```

- 2 Type the appropriate PF key values in the fields. PF keys 1 through 12 are displayed initially. To display PF keys 13 through 24, press Enter.
- 3 Press PF03/PF15 to return to the previous screen.

Using an AKR

Analyzed programs are stored in a BDAM or VSAM file organization in the AKR for Insight to use when testing. Define a AKR to be shared by all users, or define multiple AKRs for use by departments, groups, or individuals.

Online and batch utilities help you manage the AKR. The utilities provide these capabilities:

- Allocating or expanding the AKR
- Renaming and deleting programs
- Printing or punching AKR directory and program information

Note:

For more information about the Analyze options and how to analyze programs, see the Analyze chapter in the *ASG-Insight Reference Guide*.

Allocating an AKR

To allocate an AKR

- 1 Select File ► AKR utility bar and press Enter. The File - AKR Utility pop-up, shown in [Figure 19](#), displays.

Figure 19 • File - AKR Utility Pop-up

```

                                     File - AKR Utility
Command ==> -----
      Blank - Display member list      D - Delete member
      A      - Allocate/expand AKR     R - Rename member

Application Knowledge Repository (AKR):
Data set name . . 'VIATEST_APL.AKR'
Member . . . . . (if "R" or "D" selected)
New name . . . . . (if "R" selected)
Volume serial . . ----- (if not cataloged)
Password . . . . . (if password protected)
```

- 2 Specify the name of the AKR in the Data set name field.

- 3 Type A in the primary command input area and press Enter. The File - AKR Allocate/Expand pop-up, shown in [Figure 20](#), displays.

Note:

Four possible pop-ups may display, because both BDAM and VSAM AKRs are supported. The pop-up that displays depends on whether you use BDAM or VSAM AKRs and if SMS is turned on for your site.

Figure 20 • File - AKR Allocate/Expand Pop-up with SMS

```

File - AKR Allocate/Expand
Command ==> _____

      S - Submit JCL      E - Edit JCL      C - Specify Catalog

Expand existing AKR . . . NO          (Yes or No)

AKR data set name . . . . 'USER.TEST.AKR'
Management Class . . . . _____ (Blank for default MGMTCLAS)
Storage Class . . . . _____ (Blank for default STORCLAS)
Volume . . . . . _____
Data Class . . . . . _____ (Blank for default DATACLAS)
Space units . . . . . RECORDS (Records, Tracks or Cylinders)
Space amount . . . . . 4000 (Total AKR size in above units)
Unique . . . . . YES (Enter NO for a VSAM data space)

Job statement information:
//NAME      JOB (ACCOUNT),NAME,
//          MSGCLASS=A
//*      INSERT '/*ROUTE PRINT NODE.USER' HERE IF NEEDED.
//*
```

- 4 Type the appropriate information in the required fields:
- Type NO in the Expand existing AKR field.
 - Verify the AKR name in AKR data set name field.
 - Specify a valid Job card in the Job statement information field.
 - Press Enter.
- 5 Type S in the primary command input area and press Enter to submit the JCL.

Or

Type E in the primary command input area and press Enter to edit the JCL. While in the editor, review the generated JCL, type the standard ISPF SUBMIT command in the primary command input area and press Enter. To return to the File - AKR Allocate/Expand pop-up, type END in the primary command input area or press PF03/PF15.

- 6 Verify the AKR allocation results by examining the job output. Sample job outputs are presented in ["Verifying AKR Allocation Results" on page 32](#).

Verifying AKR Allocation Results

After the AKR allocation Batch job has completed, review the job output to verify successful allocation and initialization. [Figure 21](#), [Figure 22](#), and [Figure 23](#) show output excerpts with messages that indicate successful AKR allocation and initialization.

Figure 21 • IDCAMS Utility Condition Code Message Output

```
IDCAMS  SYSTEM SERVICES                TIME: HH:MM:SS      MM/DD/YY      PAGE  1

  DEFINE CLUSTER -
    (NAME(USER.TEST.AKR) -
    CYLINDERS(5) -
    VOLUME(DISK01) -
    CONTROLINTERVALSIZE(4096) -
    NUMBERED -
    RECORDSIZE(4089 4089) -
    RECOVERY -
    UNIQUE -
    SHAREOPTIONS(3 3)) -
  DATA -
    (NAME(USER.TEST.AKR.DATA))
IDC0508I DATA ALLOCATION STATUS FOR VOLUME DISK01 IS 0
IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0
IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
```

Figure 22 • AKR Initialization Message Output

```
ASG-CENTER-OS(ESA)      AKR UTILITY LOG      DD-MMM-YY  HH:MM:SS  PAGE 1

  INIT DSNAME(USER.TEST.AKR)

  ASG1316I AKR "USER.TEST.AKR" INITIALIZED.

  ASG1314I *** END OF VIASYSIN ***
```

Figure 23 • AKR Utility Log Summary Message Output

```
ASG-CENTER-OS(ESA)      AKR UTILITY LOG - SUMMARY  DD-MMM-YY  HH:MM:SS  PAGE 2

  ASG1300I      1 AKR(S) INITIALIZED      0 FAILED.

  ASG1315I *** END OF SUMMARY REPORT ***
```

Using the Analyze Facility

The Program Analyze facility extracts knowledge about the program and populates the AKR with this information.

Program Analyze Requirements

The Program Analyze is similar to a COBOL compile. Like a compile, these basic program standards are required:

- The COBOL language as specified in the IBM COBOL Language Reference guides.
- A program that can be compiled without errors by an IBM COBOL II and above compiler.

COBOL II and above programs that receive error (E), severe (S), or unconditional (U) messages from the IBM compiler cannot be successfully analyzed.

Program Analyze Input

Input to the Program Analyze includes these items:

- JCL to compile the program. The JCL should be the complete JCL used to compile the program and should contain the appropriate steps to complete these tasks:
 - Fetch the source from the source manager (such as Librarian or Panvalet)
 - Execute any preprocessors
 - Invoke the compiler
- Program Analyze features. These features indicate the type of analysis to be performed.
- An initialized AKR to receive Program Analyze output.
- Program Analyze options.

Analyze Submit Facility

Use the Analyze Submit pop-up to specify the necessary information and to submit a program to be analyzed through Insight.

Note: _____

If the compile JCL resides in a source manager such as Librarian or Panvalet, you cannot use this method.

To display the Analyze Submit pop-up

- 1 Select File ► Analyze and press Enter. The File - Analyze Submit pop-up, shown in [Figure 24](#), displays.

Figure 24 • Analyze Submit Pop-up

```

                                File - Analyze Submit
Command ==> _____
                                E - Edit JCL                S - Submit JCL

Compile and link JCL (PDS or sequential):
  Data set name 'USER12.DSN.CNTL(HTEST)'

Analyze features (Y/N):
  ASG-Insight: Y

AKR data set name 'USER12.GENERAL.AKR'
AKR program name _____ (if overriding PROGRAM-ID)

Analyze options:
  _____
  _____
  _____

Compile? (Y/N) . . . . . Y      (Y if needed by features)
Link load module reusable? (Y/N) Y      (ASG-SmartTest only)
  
```

Note:

If you started your Insight session using the ESW Primary screen, the product names listed under the Analyze features (Y/N) field may differ from the names shown in this example.

- 2 Type the appropriate information in the required fields, then press Enter:
 - a Specify the PDS member or sequential dataset containing the compile/link JCL in the Data set name field.
 - b Specify the analyze feature by typing Y in the desired Analyze features (Y/N) fields.

Note:

Other analyze features are shown on this screen when additional ESW products are installed at your site. For more information on analyze options, see the Analyze chapter in the *ASG-Insight Reference Guide*.

- c Specify the AKR dataset name in the AKR data set name field.

- 3 Type S in the primary command input area and press Enter to submit the JCL.

Or

Type E in the primary command input area and press Enter to edit the JCL. While in the editor, review the generated JCL, type the standard TSO SUBMIT command in the primary command input area and press Enter. To return to the File - Analyze Submit pop-up, either type END or press PF03/PF15.

- 4 Verify the analyze results by examining the job output. Sample job outputs are presented in [Verifying Analyze Results](#).

Verifying Analyze Results

After the Compile - Analyze Batch job completes, review the job output to verify the results. Check the output for these items:

- Acceptable compiler results.
- Messages indicating the program has been successfully analyzed and stored on the AKR.
- Acceptable linkage editor results, if applicable.

Storage on the AKR does not occur if the program does not compile and analyze successfully.

Note: _____

Insight does not require a compile or link for you to use the Source View facility.

[Figure 25](#) shows an output excerpt that indicates a successful analyze.

Figure 25 • Output Excerpt Indicating Successful Analyze

```

ASG-CENTER-OS(ESA)          PROGRAM: VIAIDEMO          DD-MMM-YY  HH:MM:SS PAGE 1

LINE  ERROR MESSAGE

   ASG0237I    166 SYMBOLS PROCESSED.
   ASG0238I    165 SYMBOLS MATCHED.
   ASG0240I    207 VERBS PROCESSED.
   ASG0057W SOURCE PROGRAM CONTAINS DEAD CODE. A COMPLETE LIST MAY BE OBTAINED ONLINE.
(A)@   ASG0248I PROGRAM 'VIAIDEMO' WAS STORED IN AKR 'USER.TEST.AKR'.

(B)
-
DIAGNOSTICS LINES:  1 TOTAL - 1 WARNINGS, 0 CONDITIONALS, 0 ERRORS, 0 DISASTERS
SOURCE LINES: 468 TOTAL - 122 DATA DIVISION STATEMENTS, 228 PROCEDURE DIVISION STMTS
PARAMETERS PASSED:  NOCOBOLII,LANGVL(2),FEATURES=(S,X)
OPTIONS IN EFFECT:  BUFMAXK=2000K, FEATURES=(ASG-Insight), FLAG(W), LANGVL(2),
                   LINECNT=60, NORECUR, NOSEQ, NOSOURCE, SPACE1
ENTRY POINTS:      VIAIDEMO
EXTERNAL CALLS:     VIAIDEM1,  ILBOABN0
                   NORETURN:  ILBOABN0
END OF PROCESSING:  DD-MMM-YY  HH:MM:SS

```

(A) Message indicated program was stored on the AKR.

(B) Any Program Diagnostics is shown in this area.

4

Program Understanding and Maintenance Techniques

This chapter discusses techniques for using Insight to gain program understanding and perform maintenance, and contains these sections:

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Introduction

The Source View facility of Insight provides you with powerful program analysis tools within an interactive environment. You can quickly and easily navigate through source code and focus on the information you need in order to understand your program and save time when performing maintenance or enhancement tasks. In addition, Insight automates some common maintenance and enhancement tasks that guide you through each step of the process from analysis to source modification.

This chapter provides various programming tasks and problems, along with step-by-step instructions to help you manage them. The results of the steps, when performed on the ESW demonstration programs, are also included. These steps apply for any program that you need to understand, maintain, or enhance.

The examples in this chapter use the demonstration programs VIAIDEMO and VIAIDEM1. Use VIAIDEM3 for COBOL II Release 3 examples.

Insight Program Analysis Methodology

Program analysis is an important first step in the ESW Existing Systems Cycle (ES/Cycle). This section describes how Insight program analysis techniques are applied using a basic program analysis methodology.

Using Automated Tasks

Insight has an automated Task function you can use as a quick and easy way to solve problems involving program understanding and maintenance. From here, you can modify incorrect report and file output, enhance a data computation, debug a data-related abend, and then make changes in your editor without ever leaving your Insight session. Using automated tasks helps you save time and increase confidence in your results when performing maintenance and enhancement tasks.

Generating a Program Overview

Program Analysis generally falls into the categories shown in [Figure 25 on page 36](#). It is important to gain an overview of program structure and coding techniques to examine logical program units and all CALLing and CALLEd relationships between the units. Logical units consist of PERFORM ranges, including GOTO statements, or CALLEd programs.

Another important aspect of a program overview includes the external dimension, often determined by investigating the source code listings and program documentation. This information is crucial to your understanding of how data is passed between CALLEd programs and how the values are read in and output.

Generating a Paragraph Overview

Program paragraph cross-referencing gives you the ability to grasp how paragraphs transfer control. The interactive capability of Insight permits you to automate your process of determining how paragraphs are referenced in a program, thus eliminating the time-consuming task of manually browsing listings.

Identifying Data Item Usage

Identifying data item cross-referencing is important to understanding how and where fields are used, modified, moved to and from, and where definitions or picture clauses are located in a program. This process eliminates the need to manually examine a program for alias names, tag, and highlight them. Insight also permits you to specify the indirect references to data items by tracking their use across intermediate fields. This feature permits you to electronically highlight how specific data is manipulated in the program and the location of its final destination, a process commonly referred to as the ripple effect.

Analyzing the Program Logic

Another important part of any analysis is understanding program logical execution. The extended logic analysis component of Insight consists of these three components:

- The Program Analyzer - a Batch process that reads your COBOL source code and copybooks and gathers information on execution paths, data relationships, and program organization.
- The AKR - a BDAM or VSAM file organization that contains a copy of the COBOL source code and all of the information gathered by the Program Analyzer.
- Source View - an Insight display of a COBOL program that resides in the AKR.

Logic analysis allows you to follow program logic interactively without data or executing the program. This allows you to investigate all of the statements in all of the execution paths to all of the targets, or to a specific target and automatically record these results on an electronic scratchpad for later reference.

Applying Quality Assurance Standards

Quality assurance standards are often measured during code inspections. The intelligent search capability of Insight allows you to quickly check a COBOL program. For example, you can use Insight to quickly and easily check for these:

- Proper indentation and alignment of IF and ELSE statements
- ELSE statements on a line by themselves
- Unique sequential naming and numbering of sections and paragraphs

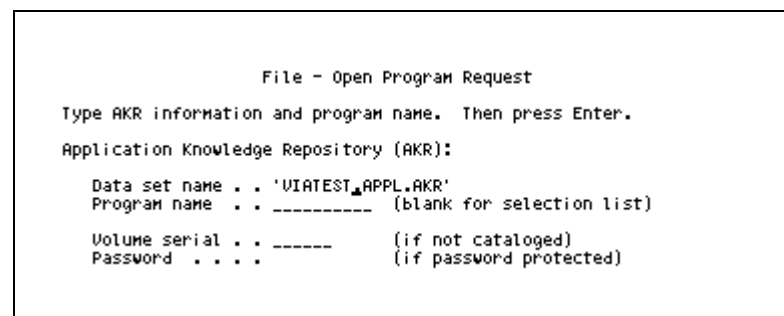
- PERFORM statements coded with the THRU clause
- Dead code and dead data
- Acceptable programming expressions

Starting an Insight Session

To start an Insight analysis session

- 1 Log on to a terminal and open Insight.
- 2 Select File ► Open and press Enter. The File - Open Program pop-up, shown in [Figure 26](#), displays.

Figure 26 • File - Open Program Pop-up



The screenshot shows a terminal window titled "File - Open Program Request". The text inside the window is as follows:

```
File - Open Program Request
Type AKR information and program name. Then press Enter.
Application Knowledge Repository (AKR):
  Data set name . . 'VIAIDEST.APPL.AKR'
  Program name . . . . . (blank for selection list)
  Volume serial . . . . . (if not cataloged)
  Password . . . . . (if password protected)
```

- 3 Type the AKR name in the Data set name field.
- 4 Type VIAIDEMO in the Program name field.
- 5 Type the required volume serial and password, if applicable, and press Enter.

Note:

The logon procedure and AKR information is unique to your programming environment. Contact your systems programmer to verify the logon and AKR information for your location.

Using Automated Tasks

Insight automates some common program maintenance and enhancement tasks. These automated tools guide you through selection pop-ups that isolate statements and datanames that pertain to a particular maintenance or enhancement project. When completed, Insight displays the source lines that modify the selected dataname in every execution path that leads to the selected statement. These statements help you understand how datanames are built prior to the given source statement.

You have the option of either viewing the results in Source View or in an edit session. These automated tasks provide you with the ability to perform these tasks quickly:

- Modify incorrect report or file output
- Enhance data computations
- Debug data-related program abends

In this section, you use Insight to determine these items:

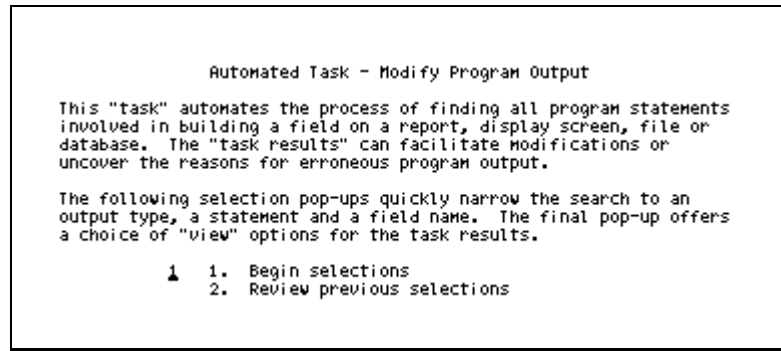
- The source of incorrect output in this program
- How to isolate the statements that are involved in a computation to make modifications
- How to debug a data-related abend in a program using Insight
- What to do to repair or enhance this program, based upon the results of the analysis
- The source of incorrect output in this program

Assume that your program is producing bad output on a report. The report output contains incorrect information in the LOAN-AMT field. The objective for this example is to determine which statements are involved in the initialization of the LOAN-AMT column of the report.

To find these statements using the automated Task function

- 1 Select Task ► Modify output and press Enter. The Automated Task - Modify Program Output pop-up, shown in [Figure 27](#), displays.

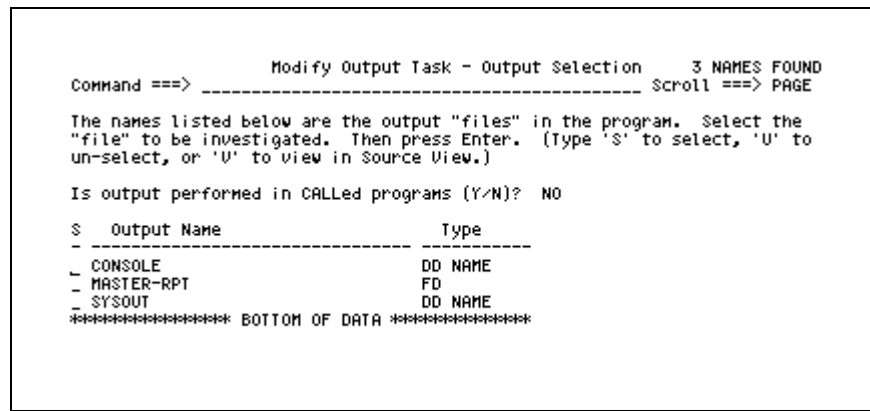
Figure 27 • Automated Task - Modify Program Output Pop-up



- 2 Specify the Begin selections option and press Enter.

The Modify Output Task - Output Selection pop-up, shown in [Figure 28](#), provides a list of all files (i.e., FDs, DDs, SDs, and RDs) to which VIAIDEMO provides output. The screen also lists CALLED programs which may perform output.

Figure 28 • Modify Output Task - Output Selection Pop-up



Assume that you have determined that the File Definition (FD), MASTER-RPT, contains incorrect output.

- 3 To examine the FD for modification of the output in a detail line, type S to the left of MASTER-RPT on the pop-up and press Enter. The Modify Output Task - Statement Selection pop-up, shown in [Figure 29](#), displays.

Figure 29 • Modify Output Task - Statement Selection Pop-up

```

                                Modify Output Task - Statement Selection
Command ==> ----- Scroll ==> PAGE

The statements listed below "write" to the selected "file". Select the
statement to be investigated. Then press Enter. (Type 'S' to select, 'U'
to un-select, or 'V' to view in Source View.)

Selected output: MASTER-RPT

$ Line      Output statement
-----
- 000354  WRITE MAST-RPT FROM DETAIL-LINE1.
- 000359  WRITE MAST-RPT FROM DETAIL-LINE2.
- 000367  WRITE MAST-RPT FROM DETAIL-LINE3.
- 000374  WRITE MAST-RPT FROM DETAIL-LINE4.
- 000426  WRITE MAST-RPT FROM SUB-PRINT.
- 000436  WRITE MAST-RPT FROM RPT-HDG-LINE1.
- 000437  WRITE MAST-RPT FROM RPT-HDG-LINE2.
- 000456  WRITE MAST-RPT FROM TOTAL-PRT
***** BOTTOM OF DATA *****

```

- 4 Determine the WRITE statement that is producing the incorrect output. If it is not clear which statement is producing the error, you may choose one of these options:
 - a Type V on the line of the suspected WRITE statement and press Enter to view the source code around that statement.
 - b Type S on the line of a suspected WRITE statement and press Enter to view the data (definitions) that are written by this statement.

Assume that statement 000354, WRITE MAST-RPT FROM DETAIL-LINE1, is producing the incorrect output.

- 5 Type S next to this output statement and press Enter. A list of all of the individual fields contained in DETAIL-LINE1 displays, as shown in [Figure 30](#).

Figure 30 • Modify Output Task - Data Name Selection Pop-up

```

                                Modify Output Task - Data Name Selection    5 NAMES FOUND
Command ==> -----> Scroll ==> PAGE

The names listed below are data items that are output by the "write"
statement selected. Select the item to be investigated. Then press Enter.
(Type 'S' to select, 'U' to un-select, or 'V' to view in Source View.)

Selected statement: 000354 WRITE MAST-RPT FROM DETAIL-LINE1.

$  Data name
-----
01 DETAIL-LINE1
  05 DET-CC
-   05 DET-NUMBER
-   05 DET-LOAN-AMT
-   05 DET-START-DATE
***** BOTTOM OF DATA *****

```

Assume that the field, DET-START-DATE (of DETAIL-LINE1) is being truncated on MASTER-REPORT.

- 6 Type S next to the DET-START-DATE dataname and press Enter. The Automated Task - Result Options pop-up, shown in [Figure 31](#), displays providing a choice of ways to view the results identified by Insight.

Figure 31 • Automated Task - Result Options Pop-up

```

                                Automated Task - Result Options

The selections are complete for this "task". All program statements that
relate to these selections are available for viewing. Select the desired
option. Then press Enter.

1  1. Source View - See the task results in Source View**
   2. Editor      - Modify the results in your editor
   3. Review      - Return to first selection pop-up

** Source View tags:
   START - Selected starting statement
   IT    - Intermediate target
   TARGET - Statement that initializes a component variable
   TARGET-U - Target with uninitialized variable
   TARGET-U? - Target with possible uninitialized variable

```


- 7 Select the Source View option and press Enter to display the Results in Source View pop-up, shown in [Figure 32](#).

Note:

Notice the description of Source View tags that appear at the bottom of the Automated Task - Result Options pop-up. These tags accompany the task results in Source View.

Figure 32 • Results in Source View

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEMO
Command ==>                               Scroll ==> PAGE
ASG1679I 3 TARGET STATEMENTS FOUND
-----
000283 CALL 'VIAIDEM1' USING MASTER-IN      282 LINES NOT DISPLAYED
000284 MASTER-END-OF-FILE                    TARGET1
000285 MASTER-REPORT-DATE.
-----
000353 MOVE LOAN-START-DATE TO DET-START-DATE. 67 LINES NOT DISPLAYED
000354 WRITE MAST-RPT FROM DETAIL-LINE1.      I/TGT-U:
-----
000405 READ MASTERIN                        50 LINES NOT DISPLAYED
-----
***** BOTTOM OF DATA *****

```

This result permits you to see the source statements that are involved in initializing the data field, DET-START-DATE, in Source View. The statement, MOVE LOAN-START-DATE TO DET-START-DATE, is tagged I/TGT-U?. The I represents an intermediate target used in the building of DET-START-DATE. The tag, TGT-U?, identifies a possibly uninitialized variable.

After reviewing the statements displayed by the automated task, it is often necessary to make changes to one or more of the displayed source statements in an edit session.

To make changes to displayed source statements

Note:

This example is demonstrated with the assumption that your installation's standard Editor is not SmartEdit.

- 1 Select Task ► See task results in editor and press Enter. The Options - COPY/Include Libraries screen displays.

Note:

If SmartEdit is installed as your editor, proceed to [step 4 on page 46](#) to display the Edit - Entry Panel shown on [Figure 34 on page 46](#).

- 2 Select SourceManager and press Enter. The SourceManager pull-down, shown in [Figure 33](#), displays.

Figure 33 • SourceManager Pull-down

```

File COBOL SourceManager Options
-----
Command ==> 1 1. PDS/Sequential Include Libraries
              2. Librarian          Scroll ==> CSR
              3. Panvalet
Specify Sour 4. SCLM
Source Manag 5. Other
              and COPY/Include Libraries.
              COBOL Version . : COBOL II R3

COPY List:
Data Set Name . :
Member . . . . :
Description . . :

Copy/Include Data Set Name(s) Type VolSer Unit Password
-----
/ 'UIA123.REL.CNTL'          PDS
***** BOTTOM OF DATA *****

```

- 3 Select a source manager option (i.e., Librarian, Panvalet) for your environment and press Enter.
- 4 Press Enter again. The Edit - Entry Panel, shown in [Figure 34](#), displays.

Figure 34 • Edit - Entry Panel

```

Menu RefList RefMode Utilities LMF Workstation Help
-----
Edit Entry Panel
Command ==>

ISPF Library:
Project . . . ASGTEST
Group . . . . UIACENXX . . . . .
Type . . . . CNTL
Member . . . . UIADEMO (Blank or pattern for member selection list)

Other Partitioned or Sequential Data Set:
Data Set Name . . .
Volume Serial . . . (If not cataloged)

Workstation File:
File Name . . . .

Options
Initial Macro . . . / Confirm Cancel/Move/Replace
Profile Name . . . - Mixed Mode
Format Name . . . - Edit on Workstation
Data Set Password . . - Preserve VB record length

```

- 5 On the Edit - Entry Panel, verify the ISPF Library Project, Group, and Type.

- 6 Type VIAIDEMO in the Member field and press Enter to display the source code in your editor, as shown in [Figure 35](#).

Note:

The source displayed in the editor is the source that resides in your installation's source manager, and not the source that resides in the AKR. You cannot use the Editor to edit the source code that is in the AKR.

Figure 35 • VIAIDEMO Program Display in SmartEdit

```
ASG-Insight Rx.x -- ASG.VIACENxx.CNTL(VIAIDEMO) - 40.00 -- COLUMNS 007 072
COMMAND ==> SCROLL ==> CSR
ASG1673I ENTER THE DISPLAY COMMAND TO VIEW THE LINES FOUND.
000100 IDENTIFICATION DIVISION.
000200 PROGRAM-ID. VIAIDEMO.
000300 AUTHOR. WRITTEN BY ASG AT LANGLVL 2.
000400 ENVIRONMENT DIVISION.
000500 CONFIGURATION SECTION.
000600 SOURCE-COMPUTER. IBM-370.
000700 OBJECT-COMPUTER. IBM-370.
000800 INPUT-OUTPUT SECTION.
000900 FILE-CONTROL.
001000     SELECT MASTERIN ASSIGN TO S-MASTERIN.
001100     SELECT MASTER-RPT ASSIGN TO S-MREPORT.
001200 DATA DIVISION.
001300 FILE SECTION.
001400 FD MASTERIN
001500     RECORDING MODE IS F
001600     BLOCK CONTAINS 0 RECORDS
001700     LABEL RECORDS ARE STANDARD.
001800
001900     COPY VIAIMAST.
002000
002100 FD MASTER-RPT
```

- 7 Type DISPLAY in the primary command input area and press Enter to display the highlighted results of your automated Task analysis in Insight, as shown in [Figure 36](#).

Figure 36 • Highlighted Results of Insight Analysis in SmartEdit

```
ASG-Insight Rx.x -- ASG.VIACENxx.CNTL(VIAIDEMO) - 01.00 -- COLUMNS 001 072
COMMAND ==> SCROLL ==> CSR
ASG1675I 3 LINES FOUND.
- - - - - 326 LINE(S) NOT DISPLAYED
HI==> 032700     MOVE LOAN-START-DATE TO DET-START-DATE.
HI==> 032800     WRITE MAST-RPT FROM DETAIL-LINE1.
- - - - - 50 LINE(S) NOT DISPLAYED
HI==> 037900     READ MASTERIN
- - - - - 93 LINE(S) NOT DISPLAYED
***** ***** BOTTOM OF DATA *****
```

You can now make any corrections or modifications to output statements in the VIAIDEMO MASTER-RPT.

- 8 To return to your Source View session, press PF03/PF15 until you reach your Source View screen.

Note: _____

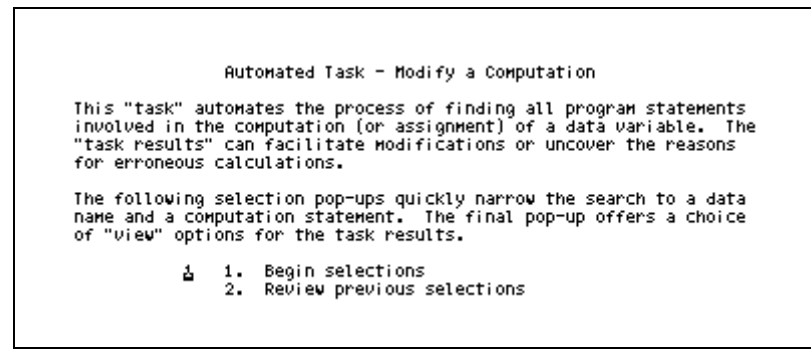
If you make changes in the editor and want to see those changes in Source View, you must reanalyze the program.

To isolate the statements that are involved in a computation

Assume that the computation of the value, ZIP-LOAN-AMT, in the program, VIAIDEMO, needs to be modified. Using Insight, you can quickly determine which statements are involved in the calculation.

- 1 Select Task ► Modify computation and press Enter. The Automated Task - Modify a Computation pop-up, shown in [Figure 37](#), displays.

Figure 37 • Automated Task - Modify a Computation Pop-up



Automated Task - Modify a Computation

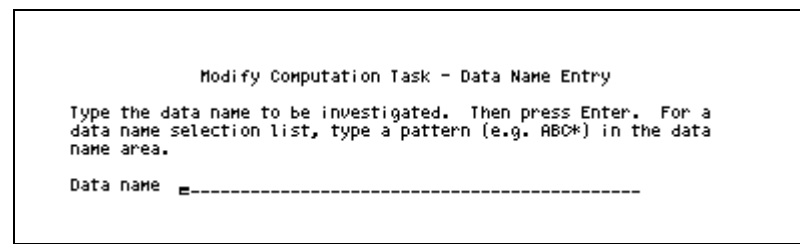
This "task" automates the process of finding all program statements involved in the computation (or assignment) of a data variable. The "task results" can facilitate modifications or uncover the reasons for erroneous calculations.

The following selection pop-ups quickly narrow the search to a data name and a computation statement. The final pop-up offers a choice of "view" options for the task results.

1. Begin selections
2. Review previous selections

- 2 Select the Begin selections and press Enter. The Modify Computation Task - Data Name Entry pop-up, shown in [Figure 38](#), displays.

Figure 38 • Automated Task - Modify Computation Task Pop-up



Modify Computation Task - Data Name Entry

Type the data name to be investigated. Then press Enter. For a data name selection list, type a pattern (e.g. ABC*) in the data name area.

Data name

If you decide you want to change the way the data value, ZIP-LOAN-AMT, is computed in VIAIDEMO, you can locate all of the modifications to the data item in the entire program. This gives you information on all of the possible places that the data is modified in logical execution order in the source code.

To review how ZIP-LOAN-AMT is used in the source code

Note:

You can use the wild card symbol, an asterisk (*), to designate a partial dataname. For this example, assume that you are not quite certain of the exact spelling of the dataname ZIP-LOAN-AMT.

- 1 Specify the Data name, ZIP*, and press Enter. The Modify Computation Task - Data Name Selection pop-up, shown in [Figure 39](#), displays.

Figure 39 • Modify Computation Task - Data Name Selection Pop-up

```

                                Modify Computation Task - Data Name Selection
Command ==> ----- $Scroll ==> PAGE

The data names listed below are assigned value in this program. Select the
name to be investigated. Then press Enter. (Type 'S' to select, 'U' to
un-select, or 'V' to view in Source View.)

Pattern ZIP**

$  Data name                      Qualification
-----
- ZIP                             01 MASTER-IN
- ZIP-CODE                        05 ZIP, 01 MASTER-IN
- ZIP-LOAN-AMT                    01 ZIP-TOTALS
- ZIP-LOAN-CNT                    01 ZIP-TOTALS
- ZIP-TOTALS                      01 ZIP-TOTALS
- ZIP-YTD-INT                     01 ZIP-TOTALS
***** BOTTOM OF DATA *****

```

- 2 Type S to the left of the dataname, ZIP-LOAN-AMT, and press Enter. The Modify Computation Task - Statement Selection pop-up, shown in [Figure 40](#), displays.

Note:

The Data Name Selection pop-up does not display if you enter the dataname ZIP-LOAN-AMT on the Automated Task - Modify Computation Task pop-up.

Figure 40 • Modify Computation Task - Statement Selection Pop-up

```

                                Modify Computation Task - Statement Selection
Command ==> ----- $scroll ==> PAGE

The statements listed below assign value to the selected data name.
Select the statement to be investigated. Then press Enter. (Type 's'
to select, 'u' to un-select, or 'v' to view in Source View.)

Selected name: ZIP-LOAN-AMT

$ Line      Computation/assignment statement
-----
_ 000386  COMPUTE ZIP-LOAN-AMT = ( ZIP-LOAN-AMT + DET-LOAN-AMT ).
_ 000392  COMPUTE ZIP-LOAN-AMT = ( ZIP-LOAN-AMT + DET-LOAN-AMT ).
***** BOTTOM OF DATA *****

```

The Modify Computation Task - Statement Selection pop-up displays every statement in the program that computes ZIP-LOAN-AMT. In most cases, several other statements initialize the data fields that are used in the computation.

- 3 Select a statement and press Enter. The Automated Task - Result Options pop-up, shown in [Figure 41](#), displays.

Figure 41 • Automated Task - Result Options Pop-up

```

                                Automated Task - Result Options

The selections are complete for this "task". All program statements that
relate to these selections are available for viewing. Select the desired
option. Then press Enter.

1  1. Source View - See the task results in Source View**
   2. Editor      - Modify the results in your editor
   3. Review      - Return to first selection pop-up

** Source View tags:
   START - Selected starting statement
   IT     - Intermediate target
   TARGET - Statement that initializes a component variable
   TARGET-U - Target with uninitialized variable
   TARGET-U? - Target with possible uninitialized variable

```

- 4 Select Source View and press Enter to display a screen similar to the Source View screen shown in [Figure 42](#).

Figure 42 • Statement in VIAIDEMO that Compute ZIP-LOAN-AMT

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEMO
Command ==>                               Scroll ==> PAGE
ASG1679I 4 TARGET STATEMENTS FOUND
-----
000283 CALL 'VIAIDEM1' USING MASTER-IN      282 LINES NOT DISPLAYED
000284                                     MASTER-END-OF-FILE      TARGET
000285                                     MASTER-REPORT-DATE.
-----
000352 MOVE LOAN-AMT TO DET-LOAN-AMT.      66 LINES NOT DISPLAYED
-----
000386 COMPUTE ZIP-LOAN-AMT = ( ZIP-LOAN-AMT + DET-LOAN-AMT ). 33 LINES NOT DISPLAYED
-----
000392 COMPUTE ZIP-LOAN-AMT = ( ZIP-LOAN-AMT + DET-LOAN-AMT ). 5 LINES NOT DISPLAYED
-----
000405 READ MASTERIN                       12 LINES NOT DISPLAYED
-----
***** BOTTOM OF DATA *****

```

As described in the previous example using automated tasks to modify output, you can choose now to view the results in an edit session.

Debugging a Data-related Abend

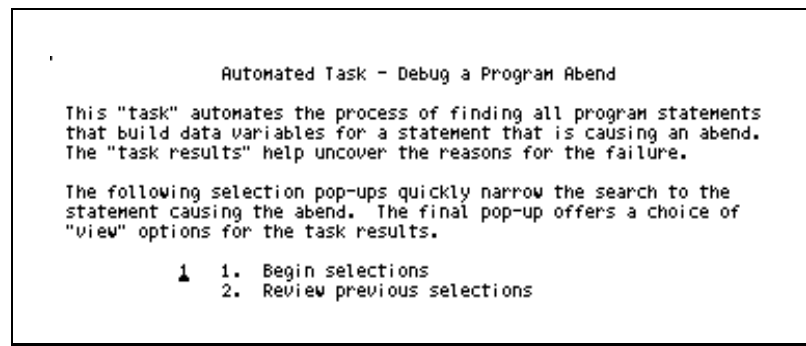
Many program abends that occur are related to data assignment and computation errors. Insight automates your task of finding every source statement that builds datanames found on an abending program statement. For example, assume that you have examined a program dump to determine the range of lines where the suspected abend occurred in your program. You would perform these steps:

- Examine the range in the source code.
- Find the source of the bad data value in a CALLED program, READ statement, or uninitialized value.

To determine the source of the bad value causing the program toabend

- 1 Select Task ► Debug abend and press Enter. The Automated Task - Debug a Program Abend pop-up, shown in [Figure 43](#) displays.

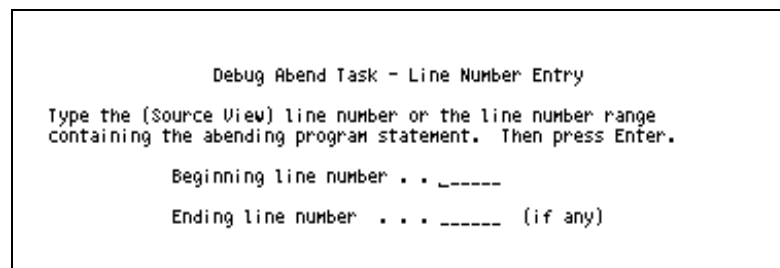
Figure 43 • Automated Task - Debug a Program Abend Pop-up



- 2 Select ► 1. Begin selections and press Enter. The Debug Abend Task - Line Number Entry pop-up, shown in [Figure 44](#), displays.

To use this technique, you must first determine either the line number or the line number range of the abending statement.

Figure 44 • Debug Abend Task - Line Number Entry Pop-up



- 3 Specify the Beginning line number (450) and the Ending line number (460) on the pop-up and press Enter. The Debug Abend Task - Statement Selection pop-up, shown in [Figure 45](#), displays.

Figure 45 • Debug Abend Task - Statement Selection Pop-up

```

                                Debug Abend Task - Statement Selection
Command ==> _____ Scroll ==> PAGE

The statements listed below are in the selected range and reference one or
more data variables. Select the statement to be investigated. Then press
Enter. (Type 'S' to select, 'U' to un-select, or 'V' to view in Source
View.)

Selected lines: 450 - 460

$ Line   Statements containing variables
-----
- 000452  MOVE ' ' TO FIRST-TIME
- 000453  MOVE TOTAL-AMT TO PRT-TOTAL-AMT
- 000454  MOVE TOTAL-CNT TO PRT-TOTAL-CNT
- 000455  MOVE TOTAL-YTD-INT TO PRT-TOTAL-YTD-INT
- 000456  WRITE MAST-RPT FROM TOTAL-PRT
- 000457  MOVE 'Y' TO MASTER-END-OF-FILE.
***** BOTTOM OF DATA *****

```

- 4 Type S next to a statement (such as line 000453, MOVE TOTAL-YTD-INT TO PRT-TOTAL-YTD-INT), where the suspected program abend occurred on the pop-up and press Enter. The Automated Task - Result Options pop-up, shown in [Figure 46](#), displays.

Figure 46 • Automated Task - Result Options Pop-up

```

                                Automated Task - Result Options

The selections are complete for this "task". All program statements that
relate to these selections are available for viewing. Select the desired
option. Then press Enter.

1. Source View - See the task results in Source View**
2. Editor      - Modify the results in your editor
3. Review     - Return to first selection pop-up

** Source View tags:
START - Selected starting statement
IT    - Intermediate target
TARGET - Statement that initializes a component variable
TARGET-U - Target with uninitialized variable
TARGET-U? - Target with possible uninitialized variable

```

- 5 Select the Source View option and press Enter. The Source View screen, shown in [Figure 47](#), displays.

Figure 47 • Selected Statements in Source View

File	View	Search	Logic	Task	List	Options	Help

Source View						Program: VIAIDEMO	
Command ==> _____						Scroll ==> CSR	
ASG1679I 3 TARGET STATEMENTS FOUND							
- - - - -						387 LINES NOT DISPLAYED	
000388	COMPUTE TOTAL-YTD-INT = (TOTAL-YTD-INT					I/TGT-U	
000389	+ YEAR-TO-DATE-INTEREST).						
- - - - -						13 LINES NOT DISPLAYED	
000403	READ MASTERIN					TARGET	
- - - - -						49 LINES NOT DISPLAYED	
000453	MOVE TOTAL-YTD-INT TO PRT-TOTAL-YTD-INT					S/TGT-U?	
- - - - -						43 LINES NOT DISPLAYED	
***** BOTTOM OF DATA *****							

Notice that these results reveal that Insight found three targets. On line 388, note the tag, I/TGT-U, which indicates that the COMPUTE statement is an intermediate target with an uninitialized variable. Also, the MOVE statement on line 453 shows a target with a possible uninitialized variable, designated by the tag, TGT-U?.

- 6 When you have completed your modifications to the program, press PF03/PF15 to return to your Source View screen.

Summary: Using Automated Tasks

- Using Insight automated Tasks, you can quickly examine and modify incorrect output, modify a data computation, or debug a data-related abend.
- Insight permits you to view the results of your investigation in the context of the program.
- Using automated Task features, you can also display the results of your analysis and make changes in your editor, without having to leave your Insight session.

Using the Insight Program Understanding Checklist

To develop a complete understanding of a COBOL program and to use this information to make enhancements, use the Insight Program Understanding Checklist. The examples in this section describe how to apply the methodology to perform program analysis and maintenance.

Getting a Program Overview

VIAIDEMO is a program provided with Insight that demonstrates the features and capabilities of the product. This program is designed to resemble a typical loan processing application. Since you are unfamiliar with this source code, begin by examining program structure and processing requirements. Assume that you choose to view only the results of your inquiry and exclude all other lines from the display.

To exclude all unwanted lines from the display

- 1 Select Options ► Modes and press Enter. The Options - Processing Modes pop-up, shown in [Figure 48](#), displays.

Figure 48 • Options - Processing Modes Pop-up

Option	Set	Description
LEARN	OFF	Display internally generated Primary Commands
SCRIPT	OFF	Script facility is disabled
XMODE	ON	Exclude all lines before executing Primary Commands

- 2 Type ON in the Set field for XMODE and press Enter.

Excluded lines are portions of the program which do not contain a result from your request. They are represented on your display by dashed lines. Excluding lines from the display allows you to see a more concise view of the results of your request.

Note:

To exit a pull-down or pop-up, press PF03/PF15 in succession until you reach the desired screen.

To see how LEARN mode works

- 1 On the Options - Processing Modes pop-up, type ON in the Set field for the LEARN option and press Enter.

Note:

With LEARN mode ON, the complete command syntax displays on a pop-up.

- 2 Press PF03/PF15.

- 3 With the LEARN option set to ON, select Search ► Data and press Enter.
- 4 On the Search - Data pop-up, type LOAN-AMT in the Data name field and select the Indirect impact option, Of size change.
- 5 Type a slash mark (/) to the left of the IN-clause Option and press Enter. The Search - Data Name pop-up, shown in [Figure 49](#), displays.

Figure 49 • Search - Data Name Pop-up

```

Search - Data Name

Type a data name and select search options. Then press Enter. For
a selection list, enter a pattern (e.g. ABC*) in the name area.

Data name  LOAN-AMT_-----

References          Indirect impact          Size change
1  1. All           1  1. None                 levels . . . ___
   2. Defs          2  2. Of size change
   3. Uses           3  3. Of value change
   4. Mods

Direction          Options                  Action
1  1. All           - No data aliasing          1  1. Find
   2. Next          - IN-clause...        2  2. Highlight
   3. Previous      3  3. Previous              3  3. Scroll
   4. First         4  4. First                 4  4. Print
   5. Last          5  5. Last                  5  5. Punch
                                   6  6. Exclude

```

Note:

Activate selections on the pull-down by typing the appropriate number(s) in the pseudo blanks. Choices on a pop-up are not activated when you position the cursor next to an entry and press Enter. Accept the default conditions for fields on a pop-up unless you are directed otherwise.

- 6 On the IN Clause Option pop-up, shown in [Figure 50](#), designate CALL as the subset name and press Enter.

Figure 50 • IN-CLAUSE Option Pop-up

```

IN-Clause Option

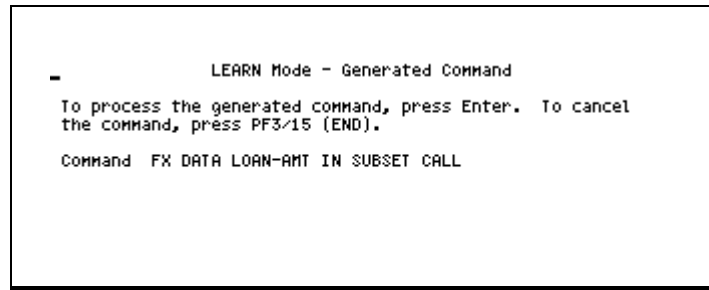
To restrict the source lines to be considered, type one or more
IN-Clause names. Then press Enter. For a selection list, type a
pattern in the appropriate name field.

Line range . . . _____
Subset name . . . CALL_-----
Paragraph Name _____
Perfrange name _____
Program name . . _____
User MARK name _____

```

The Generated Command pop-up, shown in [Figure 51](#), displays. This pop-up identifies the entire Insight command syntax. The shortest form of the command displays in upper case letters. The Command field may display results that wrap to the next line.

Figure 51 • LEARN Mode - Generated Command Pop-up



When you use the Search action, the options you select are retained until you execute another search in Insight. This permits you to conduct additional searches in your program by making only those changes to the Search action options you choose.

Note:

The examples presented are shown with LEARN mode set to OFF.

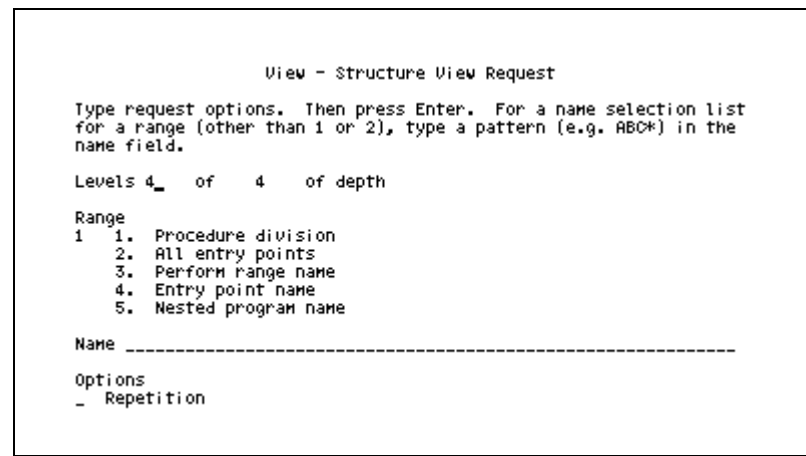
Discovering Program Structure and Coding Techniques

Insight gives you an overview of either structured or unstructured programs. With Source View, you can gain valuable understanding about various aspects of the program. To understand a particular program, how it works, and how it was written, you must have some basic information.

To investigate the structure of the program, VIAIDEMO

- 1 Select View ► Structure and press Enter. The View - Structure View Request pop-up, shown in [Figure 52](#), displays.

Figure 52 • View - Structure View Request Pop-up



```
View - Structure View Request

Type request options. Then press Enter. For a name selection list
for a range (other than 1 or 2), type a pattern (e.g. ABC*) in the
name field.

Levels 4_ of 4 of depth

Range
1 1. Procedure division
  2. All entry points
  3. Perform range name
  4. Entry point name
  5. Nested program name

Name -----

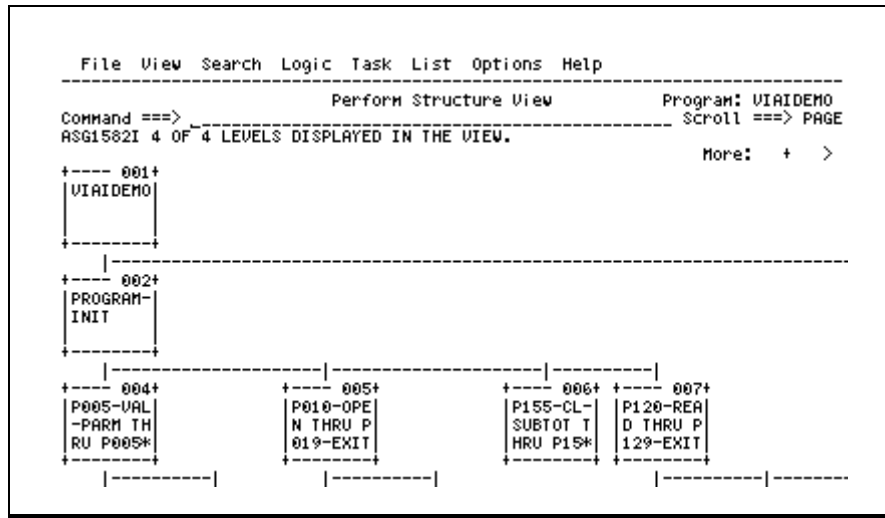
Options
- Repetition
```

- 2 Specify 4 of 4 Levels of depth and press Enter. If you leave the Range field blank, the default is the Procedure Division.

If you selected the Repetition option, you obtain a display of all duplicate PERFORM ranges. If you do not choose this option, duplicate PERFORM ranges are only flagged as REPEATED and are not expanded unless you use the View action and choose the Zoom in option on those ranges.

You can view different structural levels in the program by inserting a value in the Levels of depth field on the Structure View pop-up. [Figure 53](#) displays all four of the structural levels in VIAIDEMO. Insight automatically inserts the maximum number of program levels in the field, of depth.

Figure 53 • Perform Structure View Pop-up



The Structure View screen is a graphical representation of the PERFORM structure of a COBOL program. It displays the logical program units, which include CALLED programs and PERFORM ranges.

Note:

The plus (+) and right (>) signs indicate that you can view additional information by moving your display down or to the right.

The content and shape of the Structure View are dependent upon the COBOL program you are viewing. The long highlighted message indicates the number of levels displayed and the total number of structural levels in the program. You can use the View action to select the Source Code display or Structure View display at any time during your analysis.

If you press PF03/PF15, you can jump from a Structure View display to Source View. To return to your previous location in Structure View, you can type RSTV in the primary command input area and press Enter.

To change the scope or reformat the display, select View ► Structure View action and enter the new values.

Use these methods to scroll the display (where *n* represents the number of columns or rows):

Direction	Method
LEFT	Type LEFT <i>n</i> in the primary command input area and press Enter.
RIGHT	Type RIGHT <i>n</i> in the primary command input area and press Enter.
UP	Type UP <i>n</i> in the primary command input area and press Enter.
DOWN	Type DOWN <i>n</i> in the primary command input area and press Enter.

Logical program units are represented in a Structure View by boxes. Relationships among these units are shown with lines between the boxes.

To examine paragraphs in PERFORM range

- 1 Select View ► Zoom and press Enter.
- 2 Position your cursor inside the box containing the PERFORM range (for example, P120-READ THRU P129-EXIT) and press Enter. The Perform Range Source Code pop-up, shown in [Figure 54](#), displays.

Figure 54 • Perform Range P120-READ THRU P129-EXIT

```

Command ==> Perform Range Source Code Scroll ==> CSR
000399 P120-READ.
000400     IF END-INPUT
000401         NEXT SENTENCE
000402     ELSE
000403         READ MASTERIN
000404         AT END
000405         GO TO P170-FINAL.
000406     IF END-INPUT
000407         GO TO P129-EXIT
000408     ELSE
000409         IF DISTRICT-ID EQUAL ZEROES
000410             GO TO P120-READ.
000412 P129-EXIT.
000413     EXIT.
000446 P170-FINAL.
000447     IF FIRST-TIME = 'Y'
000448         PERFORM P999-ABEND-PROGRAM
000449     ELSE
000450         MOVE ' ' TO FIRST-TIME

```

- 3 Press PF03/PF15 to exit this expanded display of the PERFORM range.
- 4 When you have completed your examination of the program Structure View, press PF03/PF15 to return to the Source View screen.

The results of Zoom in include all of the code executed by the PERFORM range. You can scroll through the zoom in window to view the entire PERFORM range which would execute. Using this technique, you are able to gain a complete understanding of the source code.

To view a list of the CALLED programs

Assume that you think programs CALLED by VIAIDEMO may contain code that impacts this loan processing application.

- 1 Select List ► Calls on the pull-down and press Enter. The Calls List screen, shown in [Figure 55](#), displays.

Figure 55 • List - CALL Statements Pop-up

```

                                List - CALL Statements
Command ==> _____ 9 CALLS
                                Scroll ==> CSR
Select the program CALL(s) to be viewed. Then press Enter.

$   Called program                                     Mode
-   -----
-   'CD10B'                                             STATIC
-   'IOMOD'                                             DYNAMIC
-   'IO32'                                              DYNAMIC
-   'MESSAGE'                                           DYNAMIC
-   'SSMBMDT2'                                          DYNAMIC
-   'SSMBSEP'                                           DYNAMIC
-   'USERDUMP'                                          DYNAMIC
-   'UT45'                                              DYNAMIC
-   'VMOVE'                                             DYNAMIC
***** BOTTOM OF DATA *****

```

- 2 Press PF08 to scroll down and view additional CALLED Subprograms, if necessary. Internal subprograms are indented in relation to their hierarchy.

The Calls List screen displays all of the static, dynamic, and internally CALLED programs. If you want to examine individual CALL statements in a program, use the Search action and specify the CALL COBOL language subset on the Search - COBOL Subset Name pop-up. The difference between these results is subtle but important.

For example, ABENDPGM displays once on the Calls List screen, but it may be CALLED more than once in the program. This is revealed when you Search the CALL statements in VIAIDEMO.

The CALL mode is static, dynamic, or internal. In a static CALL, the object of the CALL is a literal and is link-edited into the same load module as the calling program. When the object of the CALL is an identifier that is loaded at run time, it is referred to as a dynamic CALL. An internal CALL is one that calls a nested source subprogram and is unique to COBOL II.

To view an internally CALLED program on the list

- 1 Type S in the line command area to the left of one of the desired Internal Called Subprograms on the List - CALL Statements pop-up and press Enter. You can then use all of the Insight functions to examine the CALLED program.

Note:

CALLED subprograms must be tagged as INTERNAL to be viewed from the Calls List screen. Static and dynamic programs cannot be viewed from this display.

- 2 Press PF03/PF15.

CALL is one of the COBOL language subsets. Insight classifies COBOL statements into subsets by grouping together COBOL verbs of a similar nature. This feature permits you to more quickly isolate specific information, for example, that relates to a programabend.

To examine the list of COBOL language subsets, follow this step:

- Select List ► Subsets and press Enter. The List - COBOL Subset Names pop-up, shown in [Figure 56](#), displays.

Figure 56 • LIST COBOL Subset Names Pop-up

```

List - Subset Names
Command ==> _____ $scroll ==> PAGE
Select the subset to be viewed. Then press Enter.
$ Subset Description
-----
- Assignment - COBOL: ACCEPT, ADD, SUBTRACT, MULTIPLY, DIVIDE,
               BY, COMPUTE, MOVE, FROM, INSPECT, EXAMINE,
               STRING, UNSTRING, SET, SEARCH, TRANSFORM;
               IDMS: ACCEPT, CHECK, ERASE, GET, INQUIRE, LOAD,
               PUT, RETURN;
               SQL: FETCH, SELECT INTO, SET.
- CALL        - COBOL: CALL, CANCEL, ENTRY,
               intrinsic function calls;
               CICS: LINK, XCTL;
               IDMS: ATTACH, LINK, XCTL.
- CICS        - EXEC CICS, EXEC DLI commands.
- COBOLII     - CALL (COBOLII), PERFORM (COBOLII), CONTINUE, SET,
               SERVICE LABEL, EVALUATE, INITIALIZE, end verbs.
- COBOL/370   - Statements and clauses unique to COBOL/370, such as
               intrinsic function calls, procedure pointers and

```

To view a list of any subset

- 1 From the List - COBOL Subset Name pop-up, position your cursor to the left of the subset name.
- 2 Type S and press Enter. You can view any COBOL subset using the same method.

To identify the INPUT/OUTPUT processing

Assume that you are interested in gaining an understanding of where the I/O processing occurs in this program in order to recommend changes to the output report, MAST-RPT.

- 1 On the List - COBOL Subset Names pop-up, press PF08 and move your cursor position down to IO.
- 2 Type S to the left of the IO subset name and press Enter.

In [Figure 57](#), the highlighted lines in VIAIDEMO include all of the COBOL I/O statements (I/O, Input, or Output, respectively), plus the CALL statements that contain I/O, Input, or Output. This information identifies all of the possible places that values are read in and/or output. It is useful in isolating statements that may produce incorrect output.

Figure 57 • Source View Showing I/O Processing Statements

File	View	Search	Logic	Task	List	Options	Help

Source View						14 LINES FOUND	
Command ==>						SCROLL ==>	CSR
000247		DISPLAY	'TOTAL INPUT RECORDS - '	REC-CNT.			IO
000248		DISPLAY	'END VIAIDEMO PROCESSING'	UPON CONSOLE.			IO

						63 LINES NOT DISPLAYED	
000312		OPEN	INPUT MASTERIN.				IO
000313		OPEN	OUTPUT MASTER-RPT.				IO

						38 LINES NOT DISPLAYED	
000352		WRITE	MAST-RPT FROM DETAIL-LINE1.				IO

						4 LINES NOT DISPLAYED	
000357		WRITE	MAST-RPT FROM DETAIL-LINE2.				IO

						7 LINES NOT DISPLAYED	
000365		WRITE	MAST-RPT FROM DETAIL-LINE3.				IO

						6 LINES NOT DISPLAYED	
000372		WRITE	MAST-RPT FROM DETAIL-LINE4.				IO

						30 LINES NOT DISPLAYED	
000403		READ	MASTERIN				IO

						20 LINES NOT DISPLAYED	
000424		WRITE	MAST-RPT FROM SUB-PRINT.				IO

						9 LINES NOT DISPLAYED	
000434		WRITE	MAST-RPT FROM RPT-HDG-LINE1.				IO

You can also investigate the OPEN statements in a program using the same method.

To search for specific COBOL verbs within a program

- 1 Select Search ► String and press Enter. The Search - Pattern String pop-up displays.
- 2 Type OPEN in the String field, select the IN-clause on, and press Enter.

- 3 Specify the IO Subset name and press Enter. The Source View pop-up displays the Open I/O Statements, as shown in [Figure 58](#).

Figure 58 • Open I/O Statements

```

File View Search Logic Task List Options Help
-----
Source View                                2 PATTERNS FOUND
Command ==> _____ Scroll ==> CSR

000312      OPEN INPUT MASTERIN.                                PATTERN
000313      OPEN OUTPUT MASTER-RPT.                             PATTERN
-----
***** 183 LINES NOT DISPLAYED *****
***** BOTTOM OF DATA *****

```

To save the results of the analysis for later reference

Assume that you want to save this information for later reference during analysis. To accomplish this, create a Mark on the Scratchpad.

- 1 Select Options ► Scratchpad and press Enter. The Options - Scratchpad pop-up, shown in [Figure 59](#), displays.

Figure 59 • Options - Scratchpad Pop-up

```

Options - Scratchpad

Select the desired option to create or modify
Equates and Marks. Then press Enter.

Options
1 1. Equate...
  2. Mark...
  3. Copy...
  4. Delete...
  5. Merge...
  6. Rename...

```

- 2 Select the Mark option and press Enter. The Options - Scratchpad Mark pop-up, shown in [Figure 60](#), displays.

Figure 60 • Options - Scratchpad Mark Pop-up

```

Options - Scratchpad Mark

To create a mark, type a name and a target. Then press Enter. For a
name selection list for a target type, type a pattern (e.g. ABC*) in
the target name area.

Mark name . . _-----
Target name  -----
Target type
1  1. Mark name
   2. Perfrange name
   3. Program name
   4. Subset name
   5. Line range
   6. Label name

Comments . . _-----

```

- 3 To specify a name for your Scratchpad entry, type in your unique mark name, target name and type, and comments.
- 4 Press Enter to display the Utility - Scratchpad Mark pop-up.

To recall a Mark at any time during your analysis, follow this step:

- Select List ► Marks and press Enter. The List - User Marks pop-up, shown in [Figure 61](#), displays.

Figure 61 • List - User Marks Pop-up

```

List - User Marks
Command ==> _____ Scroll ==> CSR

C : Copy set/path 1 to set/path 2.   D : Delete existing set/path 1.
M : Merge set/path 1 with set 2.     R : Rename set/path 1 to set/path 2.
S : Select the mark to be viewed.

Set/path 1      Set/path 2      Comments
-----
_ MARK1        SET _____ ALL OPEN STATEMENTS
*****
***** BOTTOM OF DATA *****

```

To print or punch these results for later reference during your analysis, select either the Print or the Punch option on a pop-up. Select the Print option to copy lines containing this result to a List file. Select the Punch option to copy the lines to a Punch file.

The List or Punch file is processed according to the default you set up in your Log/List/Punch definition.

To set up the default print and punch process on your Job Card

- 1 From the User Marks pop-up, press PF03/PF15.
- 2 Select Options ► Log/list/punch and press Enter. The Options - Log/List/Punch Definition pop-up, shown in [Figure 62](#), displays.

Figure 62 • Options - Log/List/Punch Definition Pop-up

```

Options - Log/List/Punch Definition
Command ==> _____
1 - Process log file  2 - Process list file  3 - Process punch file
                    4 - Customized data set name

Options              Log              List              Punch
-----
Process option      . . . . . K          PD          PK
Primary tracks      . . . . . 1          1           1
Secondary tracks    . . . . . 2          5           5
Lines per page      . . . . . 56         56          56
Sysout class        . . . . . *          *           *

Process options:  PK (print/keep), PD (print/delete), K, or D.
Log file is allocated

Job statement information:
//VIA123 JOB (DEUTXS,283200),
//          MSGCLASS=A
//*  INSERT '/*ROUTE PRINT NODE.USER' HERE IF NEEDED.
//*

```

- 3 Designate one of these Process Options:
 - PK (Print/Keep)
 - PD (Print/Delete)
 - K (Keep)
 - D (Delete)
- 4 To print the file from Log/List/Punch Definition screen immediately, select the option, 2 - Process LIST File and press Enter. If you do not elect to print immediately, the List file is processed when you end your Insight session.

To customize the Log, List, or Punch dataset name

If you specify K or PK process option, you can customize the dataset where the Log, List, or Punch file is allocated. By default, Insight allocates the Log, List, and Punch files in this format:

USERID.yyyynnnnn.VIAxxxxxx

where:

yyy is the product ID.

nnnnn is a sequential number from 00001 to 99999.

xxxxxx is LOG for Log, LIST for List, and PUNCH for Punch files.

If you have specified a TSO Prefix, the prefix will be appended to the beginning of the file name allocated for the Log, List, and Punch files.

- 1 From the Options - Log/List/Punch Definition pop-up, type 4 and press Enter to display the Options - Log/List/Punch Name Customization pop-up shown in [Figure 63](#).

Figure 63 • Options - Log/List/Punch Name Customization Pop-up

```

Options - Log/List/Punch Name Customization
Command ==> -----

You can define a customized name when you choose option PK (print/keep) or
K (keep) by specifying U(ser). Specifying Y(es) on Prompt later lets you
define a custom name as you process each log/list/punch file. Otherwise,
specify data set name and file mode. Then press Enter.

Options          Log      List      Punch
-----
File Naming . . . . . U      U      S      U(ser) or S(ystem)
Prompt later for DSN . . Y      Y      -      Y(es) or N(o)

The following are needed if U(ser) and N(o) are specified above

Log Data set name _____ (Seq)
File Mode . . 0      0(overwrite) or A(ppend)
List Data set name _____ (Seq)
File Mode . . -      0(overwrite) or A(ppend)
Punch Data set name _____ (Seq)
File Mode . . -      0(overwrite) or A(ppend)

```

- 2 Type U in the File Naming field for Log, List, and/or Punch to indicate a user-defined dataset name. If you specify N in the Prompt later for DSN field, you must enter a dataset name in the corresponding Data set name field and specify Overwrite or Append in the File Mode field.

If you specify Y in the Prompt later for DSN field, Insight prompts you for the dataset name during file processing. For example, if you specify Yes in the Prompt later for DSN field for the Log file, the Log Name Customization pop-up, shown in [Figure 64](#), displays.

Figure 64 • Log Name Customization Pop-up

```

                                Log Name Customization
Command ==> -----
The current log file's data set name is shown below. To have a custom
name, specify a new sequential data set name. If it already exists, it
has to have LRECL=137 and RECFM=U; and specify the file mode. Then press
Enter.
Current Data set name : ''
Custom Data set name  _-----
File Mode . . . _      0(overwrite) or A(append)
  
```

To find internal SORTs used in this program

A SORT is used primarily to process data from a master file that is not in an appropriate sequence. SORTs occur in SORT sections using input and output procedures. Assume, for this example, that you want to locate any SORTs in VIAIDEMO, remove them from the program and use an external SORT utility that is prescribed by your department standards.

In this example, Insight looks for one specific verb represented by the PERFORM COBOL subset. The PERFORM subset also looks for MERGE and PERFORM statements, in addition to locating SORT.

- 1 Select Search ► String and press Enter. The Search - Pattern String pop-up, shown in [Figure 65](#), displays.

Figure 65 • Search - Pattern String Pop-up

```

                                Search - Pattern String
Type a string and select search options. Then press Enter.
String _-----
String type                                Location
1  1. Simple                               1  1. Any
    2. Hexadecimal                         2  2. Word
    3. Text                                3  3. Prefix
    4. Picture                             4  4. Suffix
Direction                                  Options                                Action
1  1. All                                  _ IN-clause...          1  1. Find
    2. Next                                2  2. Highlight
    3. Previous                            3  3. Scroll
    4. First                               4  4. Print
    5. Last                               5  5. Punch
Begin column ___                          End column ___          6  6. Exclude
  
```


- 2 Type SORT in the String field, select the IN-clause Option on the pop-up, and press Enter.
- 3 Type PERFORM as the subset name, as shown in [Figure 66](#), and press Enter.

Figure 66 • IN-Clause Option Pop-up

```

                                IN-Clause Option

To restrict the source lines to be considered, type one or more
IN-Clause names. Then press Enter. For a selection list, type a
pattern in the appropriate name field.

Line range . . . -----
Subset name . . . PERFORM_
Paragraph Name -----
Perfrange name -----
Program name . . -----
User MARK name -----
  
```

In this example, no SORTs were found in the program, VIAIDEMO, indicated by the short message at the top right of the screen, NO PATTERNS FOUND.

To find COBOL debugging facilities used in this program

Assume that you want to examine the source to determine the expected output before you debug your program. You can use Insight to identify all of the statements containing a DEBUG, EXHIBIT, ON, READY, or RESET verb, or a D in column 7 in the program. This information may be of greatest value to you if you are unfamiliar with the source code.

- 1 Select Search ► Subset and press Enter. The Search - COBOL Subset Name pop-up, shown in [Figure 67](#), displays.

Figure 67 • Search - COBOL Subset Name Pop-up

```

                                Search - Subset Name

Type a subset name and select search options. Then press Enter.
For a selection list, type a pattern (e.g. ABC*) in the name area.

Subset name -----

Direction      Options      Action
1  1. All       _ IN-clause...  1  1. Find
    2. Next                               2. Highlight
    3. Previous                               3. Scroll
    4. First                                4. Print
    5. Last                                  5. Punch
                                           6. Exclude
  
```

- 2 Type DEBUG as the subset name, turn off the IN-clause Option on the pop-up, and press Enter.

In many cases, programs set these options to turn on based upon an internal switch setting or by a parameter passed to the program. Locating these statements allows you to investigate how these internal DEBUGs are activated.

The results, shown in [Figure 68](#), indicate that there is one debug statement found in this program. If enabled, the READY TRACE statement, when executed, sends paragraph names that are referenced to the system output file. This file provides a listing of all paragraphs executed.

Figure 68 • Source View - COBOL DEBUGging Search

File	View	Search	Logic	Task	List	Options	Help
Source View							1 STATEMENT FOUND
Command ==>							SCROLL ==> CSR
255 LINES NOT DISPLAYED							
00256		READY TRACE.					DEBUG
240 LINES NOT DISPLAYED							
***** BOTTOM OF DATA *****							

To make this result more meaningful in your analysis, you can now examine what paragraph contains this READY statement. You may also want to investigate how the READY statement gets invoked.

- 3 Select View ► Zoom and press Enter.
- 4 Position the cursor on the READY statement and press Enter.

Note:

To activate this debugging facility, you must set the compiler option.

- 5 Press PF07 to move the display up or PF08 to move down.

In [Figure 69](#), the READY TRACE is activated by the parameter, DEBUG-PARM, with a value of TEST. A Search for the definitions of the data item reveals that it is part of 01 INPUT-PARM.

Figure 69 • Source View - Expanded Statements

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEMO
Command ==>                               Scroll ==> CSR

***** ***** TOP OF DATA *****
- - - - - 252 LINES NOT DISPLAYED
000253 PROGRAM-INIT.
000254
000255     IF DEBUG-PARM = 'TEST'
000256         READY TRACE.                                DEBUG
000257
000258     PERFORM P005-VAL-PARM
000259         THRU P005-EXIT.
000260
000261     PERFORM P010-OPEN
000262         THRU P019-EXIT.
000263
000264     PERFORM P155-CL-SUBTOT
000265         THRU P159-EXIT.
000266
000267     PERFORM P120-READ
000268         THRU P129-EXIT.
000269

```

To locate GOTO clauses in a program

Locating GOTO clauses is useful in determining the degree to which a program is structured.

- 1 Select Search ► Subset and press Enter.
- 2 Type GOTO as the subset name, as shown in [Figure 70](#), and press Enter.

Figure 70 • Search - COBOL Subset Name

```

Search - Subset Name

Type a subset name and select search options. Then press Enter.
For a selection list, type a pattern (e.g. ABC*) in the name area.

Subset name GOTO

Direction      Options      Action
1 1. All        - IN-clause... 1 1. Find
  2. Next
  3. Previous
  4. First
  5. Last

```

These results, shown in [Figure 71](#), reveal that three of the five GOTOs are to EXIT paragraphs. If there were many GOTOs to paragraph names, for example, the program might be considered unstructured.

Figure 71 • Source View - GO TO Statements

```

File View Search Logic Task List Options Help
-----
Source View                               5 STATEMENTS FOUND
Command ==>                               Scroll ==> PAGE

000407      GO TO P170-FINAL.                GOTI
----- 1 LINE NOT DISPLAYED
000409      GO TO P129-EXIT.                 GOTI
----- 2 LINES NOT DISPLAYED
000412      GO TO P120-READ.                GOTI
----- 16 LINES NOT DISPLAYED
000429      GO TO P159-EXIT.                 GOTI
----- 41 LINES NOT DISPLAYED
000471      GO TO P129-EXIT.                 GOTI
----- 27 LINES NOT DISPLAYED
***** BOTTOM OF DATA *****

```

To examine the contents of P120-READ

You can investigate what happens in paragraphs P170-FINAL and P120-READ.

- 1 Select Search ► Subset and press Enter. The Search - COBOL Subset Name pop-up displays.
- 2 Specify the subset and PARAGraph, select Previous as the Direction, and press Enter.
- 3 Position the cursor on the GO TO P120-READ statement and press Enter.
- 4 Select View ► Zoom and press Enter.

- 5 Position the cursor on the P120-READ statement on line 399 and press Enter. The Source View screen, shown in [Figure 72](#), displays.

Figure 72 • Source View - Paragraph P120-READ

```

File View Search Logic Task List Options Help
-----
Source View                                12 DETAIL LINES
Command ==>                               Scroll ==> CSR

000399 P120-READ.                                PARAGRAP
000400     IF END-INPUT
000401     NEXT SENTENCE
000402     ELSE
000403     READ MASTERIN
000404     AT END
000405     GO TO P170-FINAL.
000406     IF END-INPUT
000407     GO TO P129-EXIT
000408     ELSE
000409     IF DISTRICT-ID EQUAL ZEROES                FALLTHRU
000410     GO TO P120-READ.
000411

- - - - - 85 LINES NOT DISPLAYED
***** BOTTOM OF DATA *****

```

Getting a Paragraph Overview

Now that you have gained an understanding of how this program is constructed, you can examine the details at the paragraph level.

Many organizations create programming standards that dictate that PERFORM statements must also contain a THRU clause indicating the intended ending point for that PERFORM.

To examine a list of program PERFORM ranges, follow this step:

- ▶ Select List ▶ Performs and press Enter. The List - Perform Range Names pop-up, shown in [Figure 73](#), displays.

Figure 73 • List - Perform Range Names Pop-up

```

                                     List - Perform Range Names      10 PERFORM RANGES
Command ==> _____ Scroll ==> PAGE

Select the perform range to be viewed. Then press Enter.

  Perform range name
  -----
  - PROGRAM-INIT
  - P000-NEXT THRU P000-EXIT
  - P005-VAL-PARM THRU P005-EXIT
  - P010-OPEN THRU P010-EXIT
  - P100-PRINT THRU P119-EXIT
  - P120-READ THRU P129-EXIT
  - P150-SUBTOT THRU P169-EXIT
  - P155-CL-SUBTOT THRU P159-EXIT
  - P160-HDG THRU P169-EXIT
  - P999-ABEND-PROGRAM
  ***** BOTTOM OF DATA *****
```

These results indicate that the THRU clause has not been coded with the PERFORM LABEL, PROGRAM-INIT, or the Section PERFORM, P999-ABEND-PROGRAM OF ABEND-PROGRAM.

To examine the source code in a PERFORM range on this list, type S to the left of the desired range and press Enter. You may want to make a note of these results when you examine the program during the next analysis phase involving Quality Assurance and Standards.

Using the List action, you can also isolate possible recursion of PERFORMed routines in a program. [Figure 74](#) shows a Perform Ranges List screen with one recursion found. VIAIDEMO does not contain recursion. This screen sample has been created for illustration purposes only and cannot be found in VIAIDEMO. If there is recursion in your program, it is marked with an asterisk (*) on the Perform Ranges List screen.

Figure 74 • Program Recursion - Perform Ranges List

```

====>                                Perform Ranges List                                28 PERFORM RANGES
ASG1365I 28 PERFORM RANGES, 1 RECURSIVE.                                SCROLL ==> CSR

Enter S before Perform Label to select for viewing.

PERFORM LABEL (* INDICATES ROUTINE IS RECURSIVELY PERFORMED)
-----
000-INITIALIZE-STORAGE
050-HANDLE-CONDITION
060-SUBSCRIPT
070-INDEX
100-CHOICE-CLEAR
1000-CAUSE-CWA-ERROR THRU 1000-CWA-ERROR-EXIT
1050-CAUSE-SEVEN-ERROR THRU 1050-SEVEN-ERROR-EXIT
1100-CAUSE-FILE-ERROR THRU 1100-FILE-ERROR-EXIT
1150-RETURN-TO-CICS
850-CAUSE-STORAGE-VIOLATION THRU 850-STORAGE-VIOLATION-EXIT
900-CAUSE-ALOT-OF-STORAGE THRU 900-ALOT-OF-STORAGE-EXIT
* 9000-CLEAR-THE-SCREEN
9100-SEND-MSG
950-CAUSE-FREEMAIN-ERROR THRU 950-FREEMAIN-ERROR-EXIT

```

Note:

For more information regarding the List screens, see the online help or the *ASG-Insight Reference Guide*.

To find the statements executed by the PERFORM range, P100-PRINT THRU P119-EXIT

Assume that you suspect a problem in the PRINT routine. You decide to examine all of the code associated with a PERFORM statement. To quickly locate and display the statements in the PERFORM range:

- 1 Type S to the left of the PERFORM range, P100-PRINT THRU P119-EXIT, on the List Perform Range Names pop-up and press Enter.

Or

Select Search ► Performs and press Enter.

- 2 Type the perform range in the Perfrange Name field and press Enter (or, press Enter on the Search - Perform Range Name pop-up to obtain a selection list, type S next to the perform range, and press Enter).

These results reveal all of the statements that could potentially be executed as a result of this PERFORM. You can scroll down through the code to investigate the location of the suspected problem in the PRINT routine.

Notice that no statements are displayed with paragraph P100-PRINT. This occurred because XMODE is turned on, excluding the comments that follow this statement.

- 3 Type S4 in the line command input area to show the two excluded lines and press Enter.

In [Figure 75](#), note the fall-through condition identified in this result on line 341, indicating that this PERFORMed paragraph does not return to the PERFORM statement on line 340. It falls through to the next paragraph.

Figure 75 • Perform Range P100-PRINT THRU P119-EXIT

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEMO
Command ===>                               Scroll ===> CSR

000324 P100-PRINT.                                PERF RNG
000325
000326 * IF THE FIRST DIGITS OF THE ZIP CODE CHANGE, PRINT THE SUBTOTALS
000327 * AND SKIP TO THE TOP OF THE PAGE.
000328
000329 P105-NOT-FIRST-TIME.                        PERF RNG
000330
000331     MOVE ZIP-CODE TO HLD-ZIP.                    PERF RNG
000332     IF HLD-ZIP-PREFIX EQUAL CUR-PREFIX          PERF RNG
000333         NEXT SENTENCE                            PERF RNG
000334     ELSE                                          PERF RNG
000335         PERFORM P150-SUBTOT                        PERF RNG
000336         THRU P169-EXIT
000337     MOVE HLD-ZIP-PREFIX TO CUR-PREFIX.            PERF RNG
000338
000339     IF LINE-CNT GREATER THAN 53                    PERF RNG
000340     PERFORM P160-HDG                              PERF RNG
000341     THRU P169-EXIT.                                FALLTHRU
000342

```

Also, notice that this program CALLs DBAREAD2 on line 345. You can use the List action with the Calls option to see if this subprogram is internally called by VIAIDEMO. If it is, you can use the File action to Open DBAREAD2 to determine how logic paths are followed across CALLED programs. This technique could be used to determine how values are passed between programs without ending your current Insight analysis session.

To perform paragraphs transfer control

The Paragraph Cross-Reference function permits you to see how control is transferred to or from the target paragraph(s). If no operand is entered after you select a Target name on the pop-up, the target paragraph is determined by the cursor location when the function is executed. Select a Target type if you do not specify a Target name. For example, if you are uncertain of the Target name, leave that field blank and choose a Target type.

- 1 Select View ► Paragraph X-ref on the pull-down and press Enter. The View - Paragraph Cross-Reference Request pop-up, shown in [Figure 76](#), displays.

Figure 76 • View - Paragraph Cross-Reference Request Pop-up

View - Paragraph Cross-Reference Request

To list transfers of control to or from paragraphs in the program, type a target name and select a target type and direction. Then press Enter. For a name selection list for a target type (other than types 1 and 6), type a pattern (e.g. ABC*) in the target name input field.

Target name LABELS

Target type	Direction
- 1. None - use cursor 2. Mark name 3. Perfrange name 4. Program name 5. Subset name 6. Line range 7. Label name	2 1. Previous 2. Next

- 2 Specify the Target name as LABELS, the Direction as NEXT, and press Enter.

Note: _____

The default setting for the Paragraph Cross-Reference function is PREVIOUS.

The Target(s) field requests the paragraph name(s) of interest, in this case the Subset, Labels, as shown in [Figure 77](#). The Direction was set to determine the paragraphs to which control is transferred. If you choose, you may use the same function to determine paragraphs from which control is transferred. To accomplish this, select Previous as the Direction on the View - Paragraph Cross Reference Request pop-up and press Enter. To Add to the target paragraph(s), type A in the column to the left of the selected paragraph and press Enter.

Figure 77 • View - Paragraph Cross Reference Pop-up

```

View - Paragraph Cross Reference
Command ==> _____ Scroll ==> PAGE
Target(s): LABELS
Direction: NEXT

  A : Add to target      P : Execute PREF      S : Select for viewing

$  Target paragraph(s)  How  Goes to
-----
-  PROCEDURE DIVISION  PERFORM  PROGRAM-INIT
-  " "                PERFORM  P000-NEXT
-  " "                PROGRAM EXIT
-  PROGRAM-INIT        RETURN   PROCEDURE DIVISION
-  " "                PERFORM  P005-VAL-PARM
-  " "                PERFORM  P010-OPEN
-  " "                PERFORM  P120-READ
-  " "                PERFORM  P155-CL-SUBTOT
-  P000-NEXT           FALLTHRU  P000-EXIT
-  " "                PERFORM  P100-PRINT
-  " "                PERFORM  P120-READ
-  P000-EXIT           RETURN   PROCEDURE DIVISION

```

If you accept the default direction, PREVIOUS, the target paragraph is added to the top of the list. If you specify NEXT, the target paragraph is added to the end of the list. Type P to execute another paragraph cross-reference or S to return to the source code with the first line of the paragraph displayed at the top of the screen. Ditto marks ("") are shown when multiple paragraphs transfer control to or from the same paragraph.

You can now print or punch this information for later reference during your analysis or to document your findings as described earlier in this section.

Hints

COBOL Language Subsets. Several examples use COBOL Language Subsets to examine program and paragraph structure. Insight classifies COBOL statements into subsets by grouping together COBOL verbs of a similar nature. You can isolate statements in a program that contain any of the approximately 30 verbs recognized with the added language intelligence of DB2, SQL, and IDMS.

The IN-Clause Option. You can use the IN-Clause option to restrict a search to specific areas of the source code. The IN-Clause option accepts any set or path. You can use concatenation to add sets together, permitting you to use just one action to check more than one set for the same target. For example, you can use the Search action to locate a dataname using the IN-Clause on the Search - Data pop-up to specify all I/O and CALLED programs in concatenated form in the field marked COBOL Subset as IO + CALL.

Summary: Getting a Program Overview

- This program is reasonably well-structured, based upon the findings from Structure View.
- Save the analysis results anytime using the scratchpad, print, and punch features.
- You can examine multiple internally CALLED programs in the same Insight session.
- You saved significant time during testing by using Insight to identify program structure, paragraph cross-references, and locate statements executed in a PERFORM range of interest.
- COBOL language subsets group together verbs of a similar nature and make it quick and easy to pinpoint targets for analysis.

Identifying Data Item Usage Cross-References

Unlike the standard compiler cross-reference, Insight offers extended cross-referencing of data items. Insight can differentiate between a use, modification, or definition of a data item. This phase of the analysis permits you to identify how loan processing data items are used and cross-referenced in this application.

Use Insight to determine as much information as you can about LOAN-AMT, including all data references, as well as the impact of a change to either size or value of the data item. Use these questions to guide you through your analysis of VIAIDEMO:

Data Item Names

Specify any COBOL reference to a data element as a dataname. If a variable is redefined to another name, Insight searches for the specified variable name and, optionally, the redefined name.

When data items overlap (for example, when a name refers to parts of multiple data items), searches are performed on each part and all references are reported. Any reference to an entry in a table is regarded as a reference to the entire table. These references are called aliases. Insight locates the direct and alias references (definitions, uses, or modifications) as opposed to simple pattern matching of the characters in the variable name.

You can specify fully qualified datanames followed by a standard COBOL OF clause and the group level dataname, for example:

```
DATA-NAME-ELEMENT OF DATA-NAME-GROUP
```

Assume, for example, that the dataname, CUST-ID-NUM, is part of two records, MASTER1-IN and MASTER2-IN. If you use the Search feature to locate CUST-ID-NUM and do not qualify either MASTER1-IN or MASTER2-IN, Insight identifies references to the data item in both records. To isolate the data item in one record or the other, you must specify the record you want to search.

You can search for multiple data items at the same time by concatenating the datanames with a plus sign (+) between them. For example:

```
DATA-NAME1 + DATA-NAME2
```

An ALIAS for a dataname refers to the Parent (higher level group item), Child (lower level group item) or Rename/Redefinition (renamed, redefined, and 88 level items). This example shows an ALIAS (all Insight references to LOAN-INFORMATION in record MASTER-IN include PAYMENT-AMT, LOAN-AMT, and INTEREST-RATE).

```
01 MASTER-IN.
   05 LOAN-INFORMATION.
   10 PAYMENT-AMT      PIC 9(7)V99.
   10 LOAN-AMT         PIC 9(13)V99.
   10 INTEREST-RATE    PIC V99999.
```

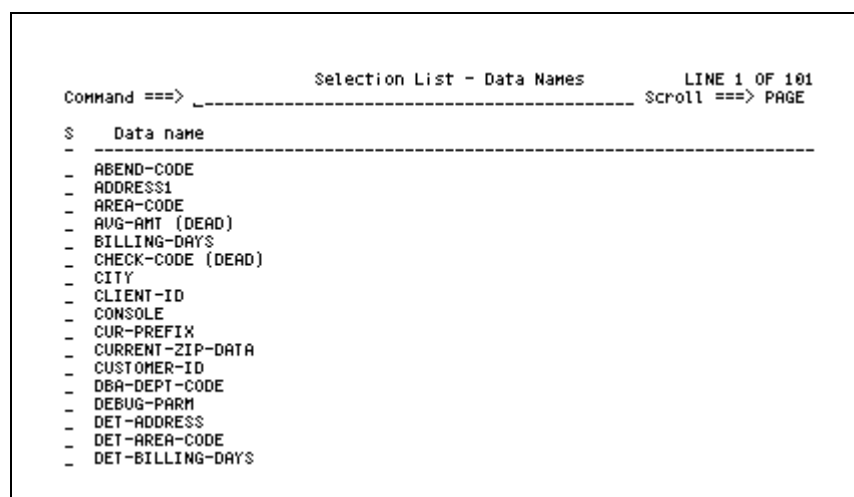
To reveal all references to LOAN-AMT in VIAIDEMO

- 1 Select Search ► Data and press Enter.

You can designate a dataname on the Search - Data pop-up or select one from the Selection List - Data Names pop-up. In the Data name field on the Search - Data Selection List pop-up, you can enter a pattern (for example, ABC* for all datanames starting with ABC) or blanks in the Data name field.

- 2 Leave the Data name field blank, leave the Indirect impact Option blank and press Enter on the Search - Data Name pop-up.
- 3 Press PF08 to move the display down until the dataname, LOAN-AMT displays, as shown in [Figure 78](#).

Figure 78 • Selection List - Data Names Pop-up



- 4 Type S to the left of the LOAN-AMT dataname and press Enter. The Search - Data Name pop-up, shown in [Figure 79](#), displays.

Figure 79 • Search - Data name Pop-up

```

Search - Data Name

Type a data name and select search options. Then press Enter. For
a selection list, enter a pattern (e.g. ABC*) in the name area.

Data name  LLOAN-AMT

References      Indirect impact      Size change
1  1. All       1  1. None      levels . . . ---
   2. Defs      2  2. Of size change
   3. Uses      3  3. Of value change
   4. Mods

Direction      Options                  Action
1  1. All       - No data aliasing      1  1. Find
   2. Next      - IN-clause...        2  2. Highlight
   3. Previous                                     3  3. Scroll
   4. First                                           4  4. Print
   5. Last                                           5  5. Punch
                                                    6  6. Exclude

```

- 5 Press Enter to display the screen shown in [Figure 80](#).

Figure 80 • All Occurrences of LOAN-AMT

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEMO
Command ==>                               Scroll ==> CSR
ASG0443I 7 DATA REFS: 4 DEFS, 1 USE, 2 MODS, FOUND FOR LOAN-AMT.
***** ***** TOP OF DATA *****
- - - - - 13 LINES NOT DISPLAYED
000014  FD  MASTERIN                                DATA DEF
000015      RECORDING MODE IS F
000016      BLOCK CONTAINS 0 RECORDS
000017      LABEL RECORDS ARE STANDARD.
- - - - - 2 LINES NOT DISPLAYED
000020  01  MASTER-IN.                                DATA DEF
- - - - - 14 LINES NOT DISPLAYED
000035      05  LOAN-INFORMATION.                      DATA DEF
- - - - - 1 LINE NOT DISPLAYED
000037      10  LOAN-AMT                                PIC 9(13)V99.  DATA DEF
- - - - - 243 LINES NOT DISPLAYED
000281      CALL 'VIAIDEM1' USING MASTER-IN              DATA MOD
000282                                MASTER-END-OF-FILE
000283                                MASTER-REPORT-DATE.
- - - - - 66 LINES NOT DISPLAYED
000350      MOVE LOAN-AMT TO DET-LOAN-AMT.              DATA USE
- - - - - 52 LINES NOT DISPLAYED

```

LOAN-AMT or its aliases are referenced in seven locations in this program. Line 281 identifies a modification of LOAN-AMT in the CALLED module, VIAIDEM1. If VIAIDEM1 resides in the AKR, LOAN-AMT is actually modified in VIAIDEM1. If VIAIDEM1 is not in the AKR, then Insight identifies the occurrence of LOAN-AMT as a possible modification.

*Locate Modifications to the Data Item**To isolate the modifications to LOAN-AMT*

- 1 Select Search ► Data and press Enter.
- 2 Specify the dataname as LOAN-AMT with the Mods option in the References field, as shown in [Figure 81](#), and press Enter.

Figure 81 • Search - Data Name Pop-up

Search - Data Name			
Type a data name and select search options. Then press Enter. For a selection list, enter a pattern (e.g. ABC*) in the name area.			
Data name LOAN-AMT			
References	Indirect impact	Size change	
4_ 1. All	1 1. None	levels . . . ---	
2. Defs	2. Of size change		
3. Uses	3. Of value change		
4. Mods			
Direction	Options	Action	
1 1. All	- No data aliasing	1 1. Find	
2. Next	- IN-clause...	2. Highlight	
3. Previous		3. Scroll	
4. First		4. Print	
5. Last		5. Punch	
		6. Exclude	

LOAN-AMT is modified in a CALLED module and again in the READ statement. [Figure 82](#) shows the modification of LOAN-AMT found in the CALLED program, VIAIDEM1. When you investigate datanames in CALLED programs, you need to identify the corresponding field name in the parameters of the CALLED program.

Figure 82 • Modifications of LOAN-AMT

```

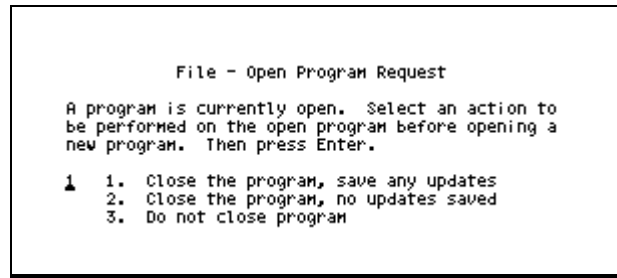
File View Search Logic Task List Options Help
-----
Command ==> Source View Program: VIAIDEM1 Scroll ==> PAGE
ASG0443I 2 DATA MODS: 2 PARENTS, FOUND FOR LOAN-AMT.
***** ***** TOP OF DATA *****
----- 282 LINES NOT DISPLAYED
000283 CALL 'VIAIDEM1' USING MASTER-IN DATA MOD
000284 MASTER-END-OF-FILE
000285 MASTER-REPORT-DATE.
----- 119 LINES NOT DISPLAYED
000405 READ MASTERIN DATA MOD
----- 93 LINES NOT DISPLAYED
***** ***** BOTTOM OF DATA *****

```

To examine the CALLED program, VIAIDEM1

- 1 Select File ► Open and press Enter. The File - Open Program Request pop-up, shown in [Figure 83](#), displays.

Figure 83 • File - Open Program Request Pop-up



- 2 Select 3. Do not close program and press Enter. The AKR Program Selection pop-up, shown in [Figure 84](#), displays.
- 3 Type S to the left of VIAIDEM1 to select the program from the list of programs in the AKR. Press Enter.

Figure 84 • AKR Program Selection Pop-up

AKR Program Selection							
Command ==> _____				Scroll ==> CSR			
Application Knowledge Repository: ASG.VIACENXX.AKR							
S	Name	Alias Of	Type	Lines	Date	Time	Jobname
-	VIAIDEMO		IN,DC,RN	496	DDMMYYYY	06:44:22	USERIDAB
-	VIAIDEM1		IN,DC,RN	174	DDMMYYYY	06:45:16	USERIDAB
-	VIAMERGE		IN,STX	468	DDMMYYYY	07:40:49	USERIDAB
-	VIAPCOB		IN,STX	974	DDMMYYYY	07:39:25	USERIDAB
-	VIASUB		IN,STX	46	DDMMYYYY	07:40:07	USERIDAB
-	VIATR01		I,SX,DC,R	324	DDMMYYYY	07:52:37	USERIDAB
-	VIATR02		I,SX,DC,R	49	DDMMYYYY	07:55:51	USERIDAB
***** BOTTOM OF DATA *****							

You can now use all of the Insight features to investigate VIAIDEM1, shown in [Figure 85](#).

Figure 85 • VIAIDEM1

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEM1
Command ==>                               Scroll ==> CSR

***** ***** TOP OF DATA *****
000001 IDENTIFICATION DIVISION.
000002 PROGRAM-ID. VIAIDEM1.
000003 AUTHOR. WRITTEN BY ASG AT LANGLVL 2.
000004 ENVIRONMENT DIVISION.
000005 CONFIGURATION SECTION.
000006 SOURCE-COMPUTER. IBM-370.
000007 OBJECT-COMPUTER. IBM-370.
000008 INPUT-OUTPUT SECTION.
000009 FILE-CONTROL.
000010         SELECT DAILY-TOTALS ASSIGN TO S-DTOTALS.
000011 DATA DIVISION.
000012 FILE SECTION.
000013 FD DAILY-TOTALS
000014         RECORDING MODE IS F
000015         BLOCK CONTAINS 0 RECORDS
000016         LABEL RECORDS ARE STANDARD.
000017
000018 01 TOTAL-REPORT.

```

To locate the modification of LOAN-AMT in VIAIDEM1

- 1 Select Search ► Data and press Enter. The Search - Data Name pop-up, shown in [Figure 86](#), displays.

Figure 86 • Search - Data Name Pop-up

```

Search - Data Name

Type a data name and select search options. Then press Enter. For
a selection list, enter a pattern (e.g. ABC*) in the name area.

Data name LOAN-AMT

References          Indirect impact          Size change
4_ 1. All           1 1. None                  levels . . . ___
   2. Defs
   3. Uses          2. Of size change
   4. Mods          3. Of value change

Direction          Options                    Action
1 1. All           - No data aliasing          1 1. Find
   2. Next         - IN-clause...          2. Highlight
   3. Previous
   4. First
   5. Last

```

- 2 Identify the dataname (LOAN-AMT), specify Mods in the References field, and press Enter.

The result identifies the modification of LOAN-AMT in VIAIDEM1, as shown in [Figure 87](#).

Figure 87 • Modifications of LOAN-AMT in VIAIDEM1

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEM1
Command ==>                               Scroll ==> CSR
ASG0443I 2 DATA MODS: 1 PARENT, FOUND FOR LOAN-AMT.
***** ***** TOP OF DATA *****
- - - - - 107 LINES NOT DISPLAYED
000108 PROCEDURE DIVISION USING MASTER-IN,          DATA MOD
000109                                MASTER-END-OF-FILE,
000110                                MASTER-REPORT-DATE.
- - - - - 3 LINES NOT DISPLAYED
000114 MOVE INIT-AMTS TO LOAN-AMT          DATA MOD
- - - - - 60 LINES NOT DISPLAYED
***** ***** BOTTOM OF DATA *****

```

*To expand the **MOVE** statement to look at the detail associated with the passing of the value **INIT-AMTS** to **LOAN-AMT***

- 1 Select View ► Zoom in and press Enter.
- 2 Position the cursor on the statement **MOVE INIT-AMTS TO LOAN-AMT** in VIAIDEM1 and press Enter. The result is shown in [Figure 88](#).

Figure 88 • Expanded Statements in VIAIDEM1

```

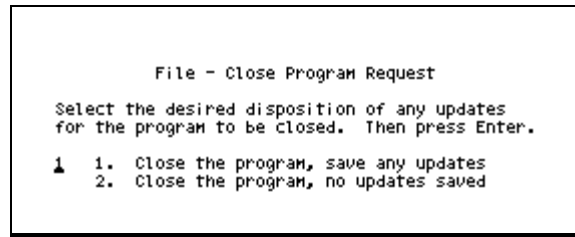
File View Search Logic Task List Options Help
-----
Source View                                13 DETAIL LINES
Command ==>                               Scroll ==> CSR
***** ***** TOP OF DATA *****
- - - - - 107 LINES NOT DISPLAYED
000108 PROCEDURE DIVISION USING MASTER-IN,          DATA MOD
000109                                MASTER-END-OF-FILE,
000110                                MASTER-REPORT-DATE.
000111
000112 IF FIRST-TIME = 'Y'
000113     OPEN OUTPUT DAILY-TOTALS
000114     MOVE INIT-AMTS TO LOAN-AMT          DATA MOD
000115     MOVE ' ' TO FIRST-TIME      ELSE      FALLTHRU
000116     IF END-INPUT
000117     PERFORM P200-PRINT-TOTALS
000118             THRU P299-EXIT
000119     CLOSE DAILY-TOTALS
000120     GO TO P009-END-PROGRAM
000121 ELSE
000122     PERFORM P100-COMPUTE-TOTALS
000123             THRU P199-EXIT.          FALLTHRU
000124

```

- 3 Select File ► Close and press Enter.

- 4 On the File - Close Program Request pop-up, shown in [Figure 89](#), select 2. Close the program, no updates saved and press Enter.

Figure 89 • File - Close Program Request



Determining the Impact of Changes to the Size or Value of LOAN-AMT

When you change the way a data item is used, you impact related program logic, which may create a ripple effect. You can use the Search function with the Indirect impact option, Of value change, to follow the data flow from one field to the next (Field A to B, B to C, C to D, etc.).

For example, data item A has only two values. You change the code to permit three values. If the value in A is transferred to other data items and an unexpected data item value is found, the program may fail. Search, used in conjunction with the Of value change option, locates those indirectly related data items and logic that may depend on the values contained in A.

First, determine the impact to this program of a change to the size of LOAN-AMT. Then determine the impact to this program of a change to the value of LOAN-AMT in the same manner.

Specify the number of Levels to designate the depth of the indirect references to the data item. If you designate the Indirect impact Of size change without specifying levels, the default value is ALL. All datanames indirectly affected by a change in the size of a dataname are located.

If you specify the number of levels you want to search, only the results of the desired levels are highlighted. You can see the ripple effect more clearly if you start your investigation by setting Levels to 1, then increasing the number on each subsequent Search action.

To search levels for indirect impact

- 1 Select Search ► Data and press Enter.
- 2 Specify the LOAN-AMT dataname, select the Of size change Indirect impact option, as shown in [Figure 90](#), and press Enter.

Note:

For the purpose of this example, leave the Levels field blank on the Search - Data Name pop-up. This reveals all indirect references at the maximum levels of depth for LOAN-AMT.

Figure 90 • Search - Data Name Pop-up

Search - Data Name

Type a data name and select search options. Then press Enter. For a selection list, enter a pattern (e.g. ABC*) in the name area.

Data name _____

References 1 1. All 2. Defs 3. Uses 4. Mods	Indirect impact 2 1. None 2. Of size change 3. Of value change	Size change levels . . . ____
--	--	---

Direction 1 1. All 2. Next 3. Previous 4. First 5. Last	Options - No data aliasing - IN-clause...	Action 1 1. Find 2. Highlight 3. Scroll 4. Print 5. Punch 6. Exclude
---	--	---

This information reveals all of the references to LOAN-AMT that would be impacted if you modified the size of LOAN-AMT. To view the results that were not displayed in [Figure 91](#), press PF08 to scroll down. To scroll back up, press PF07.

Figure 91 • Indirect Impact of Size Change to LOAN-AMT

File	View	Search	Logic	Task	List	Options	Help
-----				Source View		Program: VIAIDEMO	
Command ==>						Scroll ==> CSR	
000281	CALL	'VIAIDEM1'	USING	MASTER-IN		DATA	MOD
000282				MASTER-END-OF-FILE			
000283				MASTER-REPORT-DATE.			
-----						66 LINES NOT DISPLAYED	
000350	MOVE	LOAN-AMT	TO	DET-LOAN-AMT.		DATA	REF
-----						1 LINE NOT DISPLAYED	
000352	WRITE	MAST-RPT	FROM	DETAIL-LINE1.		DATA	REF
-----						2 LINES NOT DISPLAYED	
000355	MOVE	YEAR-TO-DATE-INTEREST	TO	DET-YTD-INT.		DATA	REF
000356	MOVE	LAST-BILL-DATE	TO	DET-LAST-BILL-DATE.		DATA	USE
000357	WRITE	MAST-RPT	FROM	DETAIL-LINE2.		DATA	REF
-----						5 LINES NOT DISPLAYED	
000363	MOVE	PAYMENT-AMT	TO	DET-PAYMENT-AMT.		DATA	USE
-----						1 LINE NOT DISPLAYED	
+-----+ TA US							
ASG0443I 79 DATA REFS: 49 DEFS, 14 USES, 16 MODS, 26 LEVELS FOUND FOR						LAYED	
LOAN-AMT.						TA US	
+-----+ LAYED							
000384	COMPUTE	ZIP-LOAN-AMT	=	(ZIP-LOAN-AMT + DET-LOAN-AMT) .		DATA	MOD

If you change the size of LOAN-AMT, you impact the program in 79 different places.

Now, repeat the process again. This time, determine the Indirect impact, Of value change, to LOAN-AMT to determine the ripple effect of a change in value to the same data item.

As shown in [Figure 92](#), if you change the value of LOAN-AMT, you would impact this program in 23 different locations in the program, VIAIDEMO.

Figure 92 • Indirect Impact of Value Change to LOAN-AMT

File	View	Search	Logic	Task	List	Options	Help
-----				Source View		Program: VIAIDEMO	
Command ==>						Scroll ==> CSR	
ASG0443I 23 DATA REFS: 13 DEFS, 8 USES, 2 MODS FOUND FOR LOAN-AMT.							
000281	CALL	'VIAIDEM1'	USING	MASTER-IN		DATA	MOD
000282				MASTER-END-OF-FILE			
000283				MASTER-REPORT-DATE.			
-----						66 LINES NOT DISPLAYED	
000350	MOVE	LOAN-AMT	TO	DET-LOAN-AMT.		DATA	USE
-----						1 LINE NOT DISPLAYED	
000352	WRITE	MAST-RPT	FROM	DETAIL-LINE1.		DATA	USE
-----						31 LINES NOT DISPLAYED	
000384	COMPUTE	ZIP-LOAN-AMT	=	(ZIP-LOAN-AMT + DET-LOAN-AMT) .		DATA	USE
-----						5 LINES NOT DISPLAYED	
000390	COMPUTE	ZIP-LOAN-AMT	=	(ZIP-LOAN-AMT + DET-LOAN-AMT) .		DATA	USE
-----						12 LINES NOT DISPLAYED	
000403	READ	MASTERIN				DATA	MOD
-----						18 LINES NOT DISPLAYED	
000422	MOVE	ZIP-LOAN-AMT	TO	SUB-LOAN-AMT.		DATA	USE
-----						1 LINE NOT DISPLAYED	
000424	WRITE	MAST-RPT	FROM	SUB-PRINT.		DATA	USE
-----						72 LINES NOT DISPLAYED	
*****				BOTTOM OF DATA		*****	

You can limit your impact search to specific types of COBOL statements by using the IN clause. For example, you can search the indirect impact of a size change to a data item for all references in CONditiOnal statements. You can also search for the indirect impact of a change in a data value for all modifications in I/O and CALL statements.

This method provides a way to isolate specific or explicit references to the data item quickly and easily. For example, you can specify MODs, USEs, DEFs individually or collectively during your investigation of a data item.

Identifying Data Items Referred to in INPUT/OUTPUT Operations or CALLs

To determine where LOAN-AMT occurs in I/O and CALL statements

- 1 Select Search ► Data and press Enter.
- 2 Type LOAN-AMT in the Data name field, specify None for the Indirect impact field, and select the IN-clause option, as shown in [Figure 93](#).

Figure 93 • Search - Data Pop-up

```

Search - Data Name

Type a data name and select search options. Then press Enter. For
a selection list, enter a pattern (e.g. ABC*) in the name area.

Data name  LOAN-AMT_____

References      Indirect impact      Size change
1  1. All       1  1. None             levels . . . ___
   2. Defs      2.  Of size change
   3. Uses      3.  Of value change
   4. Mods

Direction      Options                Action
1  1. All       - No data aliasing      1  1. Find
   2. Next      / IN-clause...           2. Highlight
   3. Previous  3.  Of size change             3. Scroll
   4. First     4.  Of value change        4. Print
   5. Last                                           5. Punch
                                           6. Exclude
  
```

- 3 Press Enter to display the IN-Clause Option pop-up, shown in [Figure 94](#).

Figure 94 • IN-Clause Option Pop-up

```

IN-Clause Option

To restrict the source lines to be considered, type one or more
IN-Clause names. Then press Enter. For a selection list, type a
pattern in the appropriate name field.

Line range . . . : _____
Subset name . . . : IO + CALL_____
Paragraph Name   : _____
Perfrange name   : _____
Program name . . : _____
User MARK name   : _____
  
```

- 4 Type IO + CALL and press Enter.

[Figure 95](#) shows that one of the references to LOAN-AMT occurs in the CALLED program, VIAIDEM1, and the other in a READ statement. You can open VIAIDEM1 to see how this data item is being modified without terminating your current examination of VIAIDEMO, as described earlier.

Figure 95 • References to LOAN-AMT in Modifications and CALLs

```

File View Search Logic Task List Options Help
-----
Source View                                PROGRAM: VIAIDEMO
Command ==>                               SCROLL ==> CSR
ASG0443I 2 DATA REFS: 2 MODS, FOUND FOR LOAN-AMT IN IO + CALL.
***** ***** TOP OF DATA *****
- - - - - 280 LINES NOT DISPLAYED
000281      CALL 'VIAIDEM1' USING MASTER-IN          DATA MOD
000282                      MASTER-END-OF-FILE
000283                      MASTER-REPORT-DATE.
- - - - - 119 LINES NOT DISPLAYED
000403      READ MASTERIN                            DATA MOD
- - - - - 93 LINES NOT DISPLAYED
***** ***** BOTTOM OF DATA *****

```

This information is significant since it may reveal how data is being passed between programs or systems. you could also use it to identify the impact of changes when you move data from one file structure to another, or to a system.

Determining if the Data Item LOAN-AMT is Modified in the PERFORM Range

Earlier, you determined that LOAN-AMT is modified in the READ statement on line 403.

To verify how and where this statement is used in the PERFORM range

- 1 Select Search ► Data and press Enter.
- 2 Specify the LOAN-AMT dataname, select the Mods option and IN-Clause, as shown in [Figure 96](#).

Figure 96 • Search - Data Name Pop-up

Search - Data Name			
Type a data name and select search options. Then press Enter. For a selection list, enter a pattern (e.g. ABC*) in the name area.			
Data name LOAN-AMT			
References	Indirect impact	Size change	
4 1. All	1 1. None	levels . . . ____	
2. Defs	2. Of size change		
3. Uses	3. Of value change		
4. Mods			
Direction	Options	Action	
1 1. All	/ No data aliasing	1 1. Find	
2. Next	IN-clause...	2. Highlight	
3. Previous		3. Scroll	
4. First		4. Print	
5. Last		5. Punch	
		6. Exclude	

- 3 Press Enter to display the IN-Clause Option pop-up, shown in [Figure 97](#).

Figure 97 • Search - IN Clause Pop-up

IN-Clause Option

To restrict the source lines to be considered, type one or more IN-Clause names. Then press Enter. For a selection list, type a pattern in the appropriate name field.

Line range . . . -----

Subset name . . . -----

Paragraph Name -----

Perfrange name P120-READ THRU P129-EXIT_-----

Program name . . -----

User MARK name -----

- 4 Specify Perfrange name, P120-READ THRU P129-EXIT and press Enter.

The Source View, shown in [Figure 98](#), displays.

Figure 98 • Modifications of Loan-AMT in P120-READ THRU P129-EXIT

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEMO
Command ==>                                Scroll ==> PAGE
ASG0443I 1 DATA REF: 1 MOD, FOUND FOR LOAN-TYPE IN P120-READ THRU P129-EXIT.
***** TOP OF DATA *****
----- 405 LINES NOT DISPLAYED -----
000406      READ MASTERIN                      DATA MOD
----- 93 LINES NOT DISPLAYED -----
***** BOTTOM OF DATA *****

```

Although the dataname, LOAN-AMT, is not directly referenced in the PERFORM range, P120-READ THRU P129-EXIT, Insight is able to determine that the field is modified by the READ MASTERIN statement. This statement is found as a modification because LOAN-AMT is in the record associated with MASTERIN. To review the data relationship, use the Search - Data feature to locate the definition of LOAN-AMT.

Locating COMPUTED Values

To locate the COMPUTE statements located in a program

- 1 Select Search ► String and press Enter.
- 2 Designate COMPUTE as the string and select the IN-clause Option, as shown in [Figure 99](#).

Figure 99 • Search - Pattern Pop-up

```

                                Search - Pattern String
Type a string and select search options. Then press Enter.

String  COMPUTE_____

String type                      Location
1  1. Simple                     1  1. Any
   2. Hexadecimal                 2  2. Word
   3. Text                       3  3. Prefix
   4. Picture                    4  4. Suffix

Direction                      Options                      Action
1  1. All                        / IN-clause...      1  1. Find
   2. Next                      2  2. Highlight
   3. Previous                  3  3. Scroll
   4. First                     4  4. Print
   5. Last                     5  5. Punch
                                6  6. Exclude

Begin column ___      End column ___

```

- 3 Specify the Subset name as ASSignment on the IN-Clause Option pop-up, as shown in [Figure 100](#), and press Enter.

Figure 100 • Search - Pattern String Pop-up

```

                                IN-Clause Option

To restrict the source lines to be considered, type one or more
IN-Clause names. Then press Enter. For a selection list, type a
pattern in the appropriate name field.

Line range . . . _____
Subset name . . . Assignment_____
Paragraph Name  _____
Perfrange Name  _____
Program name . . _____
User MARK name  _____

```

This limits the result to only those COMPUTE statements that assign values in VIAIDEMO. [Figure 101](#) indicates that seven patterns containing COMPUTE were found.

Figure 101 • COMPUTE Statements in VIAIDEMO

File View Search Logic Task List Options Help			
Source View		7 PATTERNS FOUND	
Command ==>		Scroll ==> CSR	
000376	COMPUTE LINE-CNT = (LINE-CNT + 5).	PATTERN	
- - -	- - - - -	7 LINES NOT DISPLAYED	
000384	COMPUTE ZIP-LOAN-AMT = (ZIP-LOAN-AMT + DET-LOAN-AMT).	PATTERN	
000385			
000386	COMPUTE ZIP-YTD-INT = (ZIP-YTD-INT	PATTERN	
- - -	- - - - -	1 LINE NOT DISPLAYED	
000388	COMPUTE TOTAL-YTD-INT = (TOTAL-YTD-INT	PATTERN	
- - -	- - - - -	1 LINE NOT DISPLAYED	
000390	COMPUTE ZIP-LOAN-AMT = (ZIP-LOAN-AMT + DET-LOAN-AMT).	PATTERN	
- - -	- - - - -	45 LINES NOT DISPLAYED	
000436	COMPUTE PAGE-CNT = (PAGE-CNT + 1).	PATTERN	
- - -	- - - - -	42 LINES NOT DISPLAYED	
000479	COMPUTE AVG-AMT = (ZIP-LOAN-AMT / ZIP-LOAN-CNT).	PATTERN	
- - -	- - - - -	17 LINES NOT DISPLAYED	
***** ***** BOTTOM OF DATA *****			

To determine what PERFORM statements are conditionally executed

- 1 Select Search ► Subset and press Enter.
- 2 Specify the CONDITIONAL subset, set the Direction to All, and select the IN-clause Option, as shown in [Figure 102](#), and press Enter.

Figure 102 • Search - COBOL Subset Name Pop-up

Search - Subset Name

Type a subset name and select search options. Then press Enter.
For a selection list, type a pattern (e.g. ABC*) in the name area.

Subset name CONDITIONAL

Direction

Options

Action

1. All

/ IN-clause...

1. Find

2. Next

2. Highlight

3. Previous

3. Scroll

4. First

4. Print

5. Last

5. Punch

6. Exclude

- 3 Specify the PERFORM subset, as shown in [Figure 103](#), and press Enter.

Figure 103 • IN-Clause Option Pop-up

```

                                IN-Clause Option

To restrict the source lines to be considered, type one or more
IN-Clause names. Then press Enter. For a selection list, type a
pattern in the appropriate name field.

Line range . . . -----
Subset name . . . PERFORM  -
Paragraph Name -----
Perfrange name -----
Program name . . -----
User MARK name  -----

```

This search results, shown in [Figure 104](#), reveal that REC-CNT is incremented from 1 by a value of 1 in the VARYING statement located at line 244 each time this statement is performed in the program.

Figure 104 • PERFORMs of VARYING Statement

```

File View Search Logic Task List Options Help
-----
Source View                                1 STATEMENT FOUND
Command ==>> _____ Scroll ==>> CSR

000244          VARYING REC-CNT FROM 1 BY 1                      CONDITNL
000245          UNTIL END-INPUT.
- - - - - 251 LINES NOT DISPLAYED
***** ***** BOTTOM OF DATA *****

```

Hint

Use the extended search capability with a Pattern option in Insight to locate an exact string of characters. Many of the dialog pop-ups that use the Search pull-down allow you to enter a Pattern to obtain a list for the Target Name.

A pattern string is a sequence of characters, surrounded by single or double quotes if it contains blanks. You can specify strings of non-alphanumeric characters using the X'string' (hexadecimal), T'string' (test), and P'string' (picture) operands. You may also qualify by using the WORD, PREFIX, or SUFFIX subordinate operands.

Note:

For more detailed information on using Pattern Strings in Insight, see the *ASG-Insight Reference Guide*.

The extended search capability of Insight also permits you to specify a data usage. You may locate a MODification (value set or altered), USE (used), DEF (defined), or REF (all of the preceding). You can specify any legal COBOL reference for a data element as a dataname.

You can specify the Data action on the Search pull-down and select any of these types of datanames:

- Elementary dataname
- File name
- Group name
- Table name
- Table element name
- Special name

Summary: Identifying Data Item Usage Cross-References

- Using Insight, you can quickly determine all of the references to LOAN-AMT, including DEFs, MODs, and USEs. You can perform limited searching in a program to locate the impact of a change to the size and value of the data item would be before you make recommendations for modifications to the program.
- You were able to quickly see how LOAN-AMT was used in INPUT/OUTPUT statements and in CALLED programs. Once the references were located, you could open the CALLED program and examine the logic execution without ending the current Insight analysis session.
- Insight permitted you to quickly determine how the data item was used in PERFORM ranges and in specific COMPUTE statements.
- You can use the Search feature in Insight with the Pattern option. This allows you to quickly locate an exact string of characters. You can also qualify your search using the WORD, PREFIX, or SUFFIX subordinate operands.

Conducting an Analysis of Program Logic

Investigating program logic is potentially the most time consuming program analysis task. Insight provides you with the capability to analyze program logic and identify critical execution paths for further examination:

Before you investigate specific program execution from a start point to a target, you may want to look at the structural representation of the source code in logical order. To do this using Insight, use the View action with the Tree View option.

Insight tags and highlights portions of the source code based on the result of the function requested. There are also options that allow you to exclude search results from the display. The Insight function Reset allows you to remove tags and highlights from the display and to restore all lines of your source code that may have been excluded from the display.

To reset the display

- 1 Select View ► Reset and press Enter. The View - Reset Request pop-up, shown in [Figure 105](#), displays.

Figure 105 • Reset Display to Show all Source Code



- 2 Type a slash (/) in the field marked All on the pop-up. Press Enter to execute the Reset function and return to the editor screen.

Note: _____

You can use the reset function at any time to remove tags and highlights that are no longer needed and to restore excluded lines to the display.

To view the structural representation of the source code in logical order

- 1 Select View ► Tree and press Enter.
- 2 Designate Levels 5 of 5 and accept the defaults for Contents and Range, as shown in [Figure 106](#), and press Enter.

Figure 106 • View - Tree View Request Pop-up

```

View - Tree View Request

Type request options. Then press Enter. For a name selection list
for a range (other than 1 or 2), type a pattern (e.g. ABC*) in the
name field.

Levels 5_ of 5 of depth

Contents
1 1. Labels
  2. Labels and performs
  3. Labels, performs and GOTOs
  4. Labels, performs, GOTOs and
    conditionals

Range
1 1. Procedure division
  2. All entry points
  3. Perfrange name
  4. Entry point name
  5. Nested program name

Name -----

Options
_ Repetition

```

When you select the Contents option 1. Labels, you generate a Tree View display of the program structure using the paragraphs and section labels of control flow verbs. The Labels and performs option provides you with a display of the paragraphs and section labels of control flow verbs and perform range hierarchy for the program. The Labels, performs, and GOTOs option generates a structural display using control flow verbs (for example, PERFORM, GOTO, ALTER) and program labels. When you choose the Labels, performs, GOTOs, and conditionals option, you obtain a Tree View display of the conditional statements that surround control flow statements plus the control flow statements and labels. Select the Repetition Option if you choose to display all duplicate PERFORM ranges.

If you do not select the Repetition option, duplicate PERFORM ranges are flagged as REPEATED and are not expanded unless you use the Zoom in feature from the View pull-down on a PERFORM range.

The default for Name is the program you are currently viewing in Insight. The maximum number of structural levels in the program is automatically displayed to the left of the notation of depth. You must insert the number of those levels you want to view. If you choose to examine fewer than the maximum number of levels in the program, Insight displays the plus sign (+) to indicate that lower levels of program structure are not displayed. To view the lower level structure, you can use the Zoom in and Zoom out options on the View action pull-down.

In [Figure 107](#), Tree View shows all five program hierarchical levels. Tree View tags are displayed on the right of the screen.

Figure 107 • Tree View Screen

```

File View Search Logic Task List Options Help
-----
Tree View                                     LINE 1 OF 35
Command ==>                                     Scroll ==> PAGE
ASG1582I 5 OF 5 LEVELS DISPLAYED IN THE VIEW.
***** ***** TOP OF DATA *****
000000 PROCEDURE DIVISION.
000002     PROGRAM-INIT.
000003         P005-VAL-PARM.
000004             P999-ABEND-PROGRAM.
000004             P999-ABEND-PROGRAM. REPEATED
000003         P005-EXIT.
000003         P010-OPEN.
000003         P019-EXIT.
000003         P155-CL-SUBTOT.
000004         P159-EXIT.
000003         P120-READ.
000004         P170-FINAL.
000005             P999-ABEND-PROGRAM. REPEATED
000004         P179-EXIT.
000004         P200-CLOSE.
000005             P129-EXIT.
000004         P129-EXIT. REPEATED
000004 +         P120-READ. REPEATED

```

Note:

See the online help or the *ASG-Insight Reference Guide* for more information on Tree View tags.

To view the logical execution paths that lead to the statement

This procedure examines all execution paths from the beginning of the PROCEDURE DIVISION to the COMPUTE statement on line 384.

- 1 Press PF03/PF15 to return to Source View from Tree View.
- 2 Select Logic ► Label and press Enter.

- 3 Specify PROCEDURE as Label name, 384 as Start line/label, Backward (all) as Direction, Show execution path(s) from starting point to reference(s) as Action as shown on [Figure 108](#), and press Enter. Program execution displays in a backward direction from the source of the problem on line 384 to the beginning of the Procedure Division.

Figure 108 • Logic Order Search - Label Name Pop-up

```

                                Logic Order Search - Label Name

To find label references in execution order, type the label and
starting point, and select search options. Then press Enter. For a
label name selection list, type a pattern (e.g. ABC*) in the
appropriate input area.

Label name  PROCEDURE_____
Start line/label (if any) 384_____

Direction                                Options
4  1. Next                               _ Trace IN-clause...
   2. Previous
   3. Forward (all)
   4. Backward (all)

Action
_2 1. Show label name reference(s)
   2. Show execution path(s) from starting point to reference(s)
   3. Trace (single-step) from starting point to reference(s)

```

If you choose Data on the pull-down, you can view data Definitions, Uses, Modifications, or Analysis Type. When you select the Label action on the pull-down, you can follow program logic to a specific label name. Use the Subset action on the Logic pull-down to view program logic to a COBOL language subset. By selecting the Perform action, you can examine logic within a PERFORM range. The Mark action provides you with the ability to look at program execution in a specified set of marked lines. The Program action on the Logic pull-down traces the logic of the program and include pertinent DATA DIVISION/WORKING-STORAGE data elements. If you choose the Line action, you can follow the execution of the program within a given range of lines.

Examine the statements in the execution path from the Procedure Division to line 384.

The NETWORK tags on the right of the screen indicate that each statement is contained in the designated execution path. In all, there are 126 statements in this NETWORK, as shown in [Figure 109](#). You can scroll down through the statements in the NETWORK to view them online or you can rename them for later examination using the Mark selection on the Options - Scratchpad pull-down.

Figure 109 • Source View - Procedure Division to Line 384

```

File View Search Logic Task List Options Help
-----
Source View                                125 STATEMENTS FOUND
Command ===>                               Scroll ===> CSR

***** TOP OF DATA *****
- - - - - 230 LINES NOT DISPLAYED
000231  PROCEDURE DIVISION.          NETWORK
- - - - - 5 LINES NOT DISPLAYED
000237  PERFORM PROGRAM-INIT.        NETWORK
- - - - - 5 LINES NOT DISPLAYED
000243  PERFORM P000-NEXT THRU P000-EXIT  NETWORK
000244  VARYING REC-CNT FROM 1 BY 1      NETWORK
000245  UNTIL END-INPUT.
- - - - - 7 LINES NOT DISPLAYED
000253  PROGRAM-INIT.                NETWORK
- - - - - 1 LINE NOT DISPLAYED
000255  IF DEBUG-PARM = 'TEST'         NETWORK
000256  READY TRACE.                  NETWORK
- - - - - 1 LINE NOT DISPLAYED
000258  PERFORM P005-VAL-PARM           NETWORK
000259  THRU P005-EXIT.
- - - - - 1 LINE NOT DISPLAYED
000261  PERFORM P010-OPEN              NETWORK

```

Note:

If you want to include the definitions of the data items in the COMPUTE statement, select Program from the Logic pull-down, and enter the program name in the Program name field. The selections in the Direction and Action fields would be the same.

Hint

Creating NETWORKs and SUBNETs. When you examine program execution using the Logic action, you automatically create a NETWORK and SUBNETs.

A NETWORK contains all of the statements in all of the execution paths to all reachable targets.

A SUBNET contains all of the statements in all of the execution paths to a specified target.

Each time you examine source code execution in this way, you create a new NETWORK and SUBNETs replacing the previous ones. You can save the results of your analysis at anytime using these Insight features:

- OPTIONS (SCRATCHPAD pop-up)
- COPY (Action)
- MERGE (Action)
- PRINT (SEARCH pop-ups)
- PUNCH (SEARCH pop-ups)

To determine where a data item is referenced in the CALLED program

Assume that you need to know where MASTER-REPORT-DATE received the data it is passing to the CALLED program, VIAIDEM1. How is the field, MASTER-REPORT-DATE, set prior to the CALL statement?

- 1 Select Search ► Data and press Enter. The Search - Data pop-up, shown in [Figure 110](#), displays.
- 2 Specify the MASTER-REPORT-DATE dataname, specify References as All, select the IN-clause option, and press Enter.

Figure 110 • Search - Data Pop-up

Search - Data Name

Type a data name and select search options. Then press Enter. For a selection list, enter a pattern (e.g. ABC*) in the name area.

Data name MASTER-REPORT-DATE_

References	Indirect impact	Size change
1 1. All	1 1. None	levels . . . ---
2. Defs	2. Of size change	
3. Uses	3. Of value change	
4. Mods		

Direction	Options	Action
1 1. All	- No data aliasing	1 1. Find
	/ IN-clause...	2. Highlight
		3. Exclude

- 3 Specify the Subset name CALL, as shown in [Figure 111](#), and press Enter.

Figure 111 • In-Clause Option Pop-up

IN-Clause Option

To restrict the source lines to be considered, type one or more IN-Clause names. Then press Enter. For a selection list, type a pattern in the appropriate name field.

Line range . . . _____

Subset name . . . CALL_____

Paragraph Name _____

Perfrange name _____

Program Name . . _____

User MARK name _____

[Figure 112](#) shows that MASTER-REPORT-DATE displays in the CALL statement on line 283.

Figure 112 • Source View - CALLED Programs in VIAIDEMO

File View Search Logic Task List Options Help

Source View Program: VIAIDEMO

Command ==> _____ Scroll ==> CSR

ASG0443I 1 DATA REF: 1 USE, FOUND FOR MASTER-REPORT-DATE IN CALL.

***** TOP OF DATA *****

- - - - - 280 LINES NOT DISPLAYED

000281 CALL 'VIAIDEM1' USING MASTER-IN

000282 MASTER-END-OF-FILE

000283 MASTER-REPORT-DATE. DATA USE

- - - - - 213 LINES NOT DISPLAYED

***** BOTTOM OF DATA *****

To examine the logic from line 283 to the previous modification of the data item

- 1 Select Logic ► Data and press Enter. The Logic Order Search - Data Name pop-up displays.
- 2 Type MASTER-REPORT-DATE as the dataname and 283 as the Start line/label, select the Mods only References option, set the Direction to Backward (all), select the Show dataname reference(s) action, as shown in [Figure 113](#). Press Enter.

Figure 113 • Logic Order Search - Data Name Pop-up

```

                                Logic Order Search - Data Name

To find data name references in execution order, type the name and
starting point, and select search options. Then press Enter. For a
data or label name selection list, type a pattern (e.g. ABC*) in the
appropriate input area.

Data name  MASTER-REPORT-DATE

Start line/label (if any)  _____

References          Direction          Options
3  1. All            4_ 1. Next            _ Trace
   2. Uses only      2. Previous        _ IN-clause...
   3. Mods only      3. Forward (all)
                     4. Backward (all)

Action
1  1. Show data name reference(s)
   2. Show execution path(s) from starting point to reference(s)
   3. Trace (single-step) from starting point to reference(s)

```

The results shown in [Figure 114](#) indicate the target data reference as the only modification of MASTER-REPORT-DATE, looking backward from the first CALL statement.

Figure 114 • Source View - Modification of MASTER-REPORT-DATE

```

File View Search Logic Task List Options Help
-----
                                Source View                                1 MOD(S) REACHABLE
Command ==>> _____ Scroll ==>> CSR

- - - - - 430 LINES NOT DISPLAYED
000431      MOVE SPACES TO RPT-HDG-LINE1.                                DATA MOD
- - - - - 65 LINES NOT DISPLAYED
***** ***** BOTTOM OF DATA *****

```

To modify the field after the CALL statement

This time, follow the program logic in a forward direction to determine where MASTER-REPORT-DATE is modified following the CALL statement.

- 1 Select Logic ► Data and press Enter.
- 2 Type MASTER-REPORT-DATE as the dataname and line 283 as the Start line/label, set References to Mods only, Direction to Forward, and Action to Show dataname reference(s), as shown in [Figure 115](#), then press Enter.

Figure 115 • Logic - Data Pop-up

```

                                Logic Order Search - Data Name

To find data name references in execution order, type the name and
starting point, and select search options. Then press Enter. For a
data or label name selection list, type a pattern (e.g. ABC*) in the
appropriate input area.

Data name  MASTER-REPORT-DATE
Start line/label (if any) -----

References          Direction          Options
3  1. All           4  1. Next             - Trace
   2. Uses only     2. Previous          - IN-clause...
   3. Mods only     3. Forward (all)
                   4. Backward (all)

Action
1  1. Show data name reference(s)
   2. Show execution path(s) from starting point to reference(s)
   3. Trace (single-step) from starting point to reference(s)

```

The next modification of MASTER-REPORT-DATE occurs on line 431, where spaces are added to the report heading, as [Figure 116](#) reveals.

Figure 116 • Execution Path to Next Mod of MASTER-REPORT-DATE

```

File  View  Search  Logic  Task  List  Options  Help
-----
Source View          1 MOD(S) REACHABLE
Command ==> _____ Scroll ==> CSR

***** ***** TOP OF DATA *****
- - - - - 430 LINES NOT DISPLAYED
000431      MOVE SPACES TO RPT-HDG-LINE1.      DATA MOD
- - - - - 65 LINES NOT DISPLAYED
***** ***** BOTTOM OF DATA *****

```

To review the code executed in the path to this modification

- 1 Repeat [step 1](#).
- 2 Perform [step 2](#), but set the Action to Show execution path(s) from starting point to reference(s), and press Enter.

The statements in this execution path make up the NETWORK, as shown in [Figure 117](#).

Figure 117 • Execution Path to Next Modification of MASTER-REPORT-DATE

File	View	Search	Logic	Task	List	Options	Help

Source View				100 STATEMENTS FOUND			
Command ==> _____				Scroll ==> CSR			
***** TOP OF DATA *****							
-----				242 LINES NOT DISPLAYED			
000243		PERFORM P000-NEXT THRU P000-EXIT					NETWORK
000244		VARYING REC-CNT FROM 1 BY 1					NETWORK
000245		UNTIL END-INPUT.					
-----				33 LINES NOT DISPLAYED			
000279	P000-NEXT.						NETWORK
000280							
000281	CALL 'VIAIDEM1' USING MASTER-IN						NETWORK
000282		MASTER-END-OF-FILE					
000283		MASTER-REPORT-DATE.					
000284							
000285	PERFORM P100-PRINT						NETWORK
000286	THRU P119-EXIT.						
000287							
000288	PERFORM P120-READ						NETWORK
000289	THRU P129-EXIT.						FALLTHRU
000290							
000291	P000-EXIT.						NETWORK

To examine program execution step-by-step and determine the cause of a known problem

- 1 Assume that you are examining how a COMPUTE statement, which uses the data value DET-LOAN-AMT, receives its value. This might be a resolution to an Abend or just an incorrect total on a report. For the purpose of this example, assume that you suspect that the problem occurs at line 384.

To understand how the value was assigned to DET-LOAN-AMT prior to line 384, you decide to identify the last place that this field was modified.

- 2 Select Logic ► Data and press Enter. The Source View pop-up, shown in [Figure 118](#), displays.

Figure 118 • Previous Modification of DET-LOAN-AMT

File	View	Search	Logic	Task	List	Options	Help

Source View				1 MOD(S) REACHABLE			
Command ==> _____				Scroll ==> CSR			
***** TOP OF DATA *****							
-	-	-	-	-	-	-	-
						349	LINES NOT DISPLAYED
000350	MOVE LOAN-AMT TO DET-LOAN-AMT.						DATA MOD
-	-	-	-	-	-	-	-
						146	LINES NOT DISPLAYED
***** BOTTOM OF DATA *****							

- 3 Complete these fields:
 - a Type DET-LOAN-AMT as the dataname.
 - b Specify the Start line/label as 384.
 - c Select the Mods only References option.
 - d Set the Direction to Previous.
 - e Select the Show dataname reference(s) action.
- 4 Press Enter.

To examine all statements in the execution path

Now that you have identified the possible targets from line 384, you can examine all of the statements in the execution path to the previous modification of the data item, DET-LOAN-AMT.

- 1 Select Logic ► Data and press Enter. The Source View pop-up, shown in [Figure 119](#), displays.

Figure 119 • Execution Path from Line 384 to Pervious Modification

File View Search Logic Task List Options Help		

Source View		24 STATEMENTS FOUND
Command ==>		Scroll ==> CSR
000350	MOVE LOAN-AMT TO DET-LOAN-AMT.	NETWORK
000351	MOVE LOAN-START-DATE TO DET-START-DATE.	NETWORK
000352	WRITE MAST-RPT FROM DETAIL-LINE1.	NETWORK
000353		
000354	MOVE NAME TO DET-NAME.	NETWORK
000355	MOVE YEAR-TO-DATE-INTEREST TO DET-YTD-INT.	NETWORK
000356	MOVE LAST-BILL-DATE TO DET-LAST-BILL-DATE.	NETWORK
000357	WRITE MAST-RPT FROM DETAIL-LINE2.	NETWORK
000358		
000359	MOVE ADDRESS1 TO DET-ADDRESS.	NETWORK
000360	MOVE AREA-CODE TO DET-AREA-CODE.	NETWORK
000361	MOVE EXCHANGE TO DET-EXCHANGE.	NETWORK
000362	MOVE PHONE-NUMBER TO DET-PHONE-NUMBER.	NETWORK
000363	MOVE PAYMENT-AMT TO DET-PAYMENT-AMT.	NETWORK
000364	MOVE LOAN-TYPE TO DET-LOAN-TYPE.	NETWORK
000365	WRITE MAST-RPT FROM DETAIL-LINE3.	NETWORK
000366		
000367	MOVE CITY TO DET-CITY.	NETWORK
000368	MOVE STATE TO DET-ST.	NETWORK

- 2 Complete these fields:
 - a Type DET-LOAN-AMT as the dataname.
 - b Specify the Start line/label as 384.

- c Select the Mods only References option.
 - d Set the Direction to Previous.
 - e Select the Show execution path(s) from starting point to reference(s) action.
- 3 Press Enter. Insight automatically created a Network of the statements executed from the previous modification of DET-LOAN-AMT. Since DET-LOAN-AMT contains the values set by LOAN-AMT, you now need to locate where those values are set in LOAN-AMT.

To locate the data item values

- 1 Select Logic ► Data and press Enter. The Logic Order Search pop-up displays.
- 2 Type LOAN-AMT as the dataname, line 350 as the Starting point, Direction as Previous, Action as Show dataname reference(s), then press Enter.

These results, shown in [Figure 120](#), indicate that one of the previous data modifications occurs in the CALLED program, VIAIDEM1, and the other in the reading of file, MASTERIN. You could now use the procedure described earlier in this guide to open VIAIDEM1 and view how the data item is modified in VIAIDEM1.

Figure 120 • Execution Path from DET-LOAN-AMT Modification to LOAN-AMT

```

File View Search Logic Task List Options Help
-----
Source View                                2 MOD(S) REACHABLE
Command ==> _____ Scroll ==> CSR

***** ***** TOP OF DATA *****
000281      CALL 'VIAIDEM1' USING MASTER-IN          DATA MOD
000282      MASTER-END-OF-FILE
000283      MASTER-REPORT-DATE.
- - - - - 119 LINES NOT DISPLAYED
000403      READ MASTERIN                          DATA MOD
- - - - - 93 LINES NOT DISPLAYED
***** ***** BOTTOM OF DATA *****

```

When you use the Logic function in Insight to examine the execution paths of your program, the process may be suspended at either Decision Points or Stop Points.

An Execution Decision is one in which you choose an execution path in the program. These Decision Points occur on conditional statements (IF statements, for example).

A Viewing Decision is one where you choose to look at a particular section of code that is part of an execution sequence. These Decision Points occur on PERFORM statements.

A Stop Point occurs at any CALL statement. This lets you know that during actual execution, another program will be invoked. You can use the Logic function to examine program execution in the CALLED subprogram without leaving your current Source View session, providing the CALLED subprogram is on the AKR.

When your display must be scrolled because it is full or a branch takes the trace to another part of your program, a Stop Point is also encountered.

To trace the execution path from the paragraph line xxx forward to all program exits

- 1 Select Options ► Modes and press Enter.
- 2 Turn XMODE OFF on the pop-up and press Enter. This enables you to view all of the source code when tracing execution paths.
- 3 Press PF03/PF15.
- 4 Select View ► Reset and press Enter.
- 5 Select All on the pop-up and press Enter.
- 6 Select Logic ► Subset and press Enter. The Logic Order Search - Line Number Range pop-up displays.
- 7 Type EXIT as the subset, designate Start line/label as 329, set the Direction to Forward, and set the Action to Trace (single-step) from starting point to reference(s) action, as shown in [Figure 121](#). Press Enter.

Figure 121 • Logic Order Search - Line Number Range Pop-up

Logic Order Search - Line Number Range

To find line range references in execution order, type the range and starting point, and select search options. Then press Enter. For a label name selection list, type a pattern (e.g. ABC*) in the "start" field.

Line range EXIT_____

Start line/label (if any) 329_____

Direction	Options
3 1. Next	- Trace IN-clause...
2. Previous	
3. Forward (all)	
4. Backward (all)	

Action

3_ 1. Show line number range reference(s)

2. Show execution path(s) from starting point to reference(s)

3. Trace (single-step) from starting point to reference(s)

The third line of the long message area, shown in [Figure 122](#), indicates that a Decision Point was reached at line 332 and that two options are available. This is an Execution Decision based on a conditional.

Figure 122 • Execution Path to Target(s)

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEMO
Command ==>                               Scroll ==> CSR
ASG0456I DECISION: 332; 2 OPTIONS: 333, 334.
000327 *  AND SKIP TO THE TOP OF THE PAGE.
000328
000329 P105-NOT-FIRST-TIME.                                START
000330
000331     MOVE ZIP-CODE TO HLD-ZIP.
000332     IF HLD-ZIP-PREFIX EQUAL CUR-PREFIX                DECISION
000333         NEXT SENTENCE                                OPTION 1
000334     ELSE                                            OPTION 2
000335         PERFORM P150-SUBTOT
000336             THRU P169-EXIT
000337         MOVE HLD-ZIP-PREFIX TO CUR-PREFIX.
000338
000339     IF LINE-CNT GREATER THAN 53                          FALLTHRU
000340         PERFORM P160-HDG
000341             THRU P169-EXIT.                              FALLTHRU
000342
000343 P110-CONTINUE-PRINT.
000344
000345     CALL 'DBAREAD2' USING DBA-DEPT-CODE.

```

Note:

The conditional and first line of each option are tagged.

To make a selection on the Trace Decision Options pop-up

- 1 Press Enter to view to the Trace Decision Options pop-up.

The Trace Decision Options pop-up presents you with options for proceeding from the current Decision Point. The Trace Decision Options pop-up, shown in [Figure 123](#), displays the source for the decision, type of branch, line number, and first statement of each destination. An asterisk (*) next to an option indicates that you have already traced that option.

Figure 123 • Trace Decision Options Pop-up

```

Trace Decision Options
Command ==> _____ Scroll ==> CSR

Trace of: EXITS
Direction: FORWARD
Paragraph: 000329 P105-NOT-FIRST-TIME.
Decision: 000332 IF HLD-ZIP-PREFIX EQUAL CUR-PREFIX

Option Info indicates TARGET's and '*' for code already TRACE'd

Select one of the following decision options:
S      Option                                Option
      -----                                -----
- 1. TRUE (000333 NEXT SENTENCE)
- 2. FALSE (000334 ELSE)
***** BOTTOM OF DATA *****

```

- 2 Type S on the Trace Decision Options pop-up next to your choice and press Enter.
- 3 Type the number of your choice in the primary command input area and press Enter.

Note:

Insight returns you to the Source View screen and proceeds to the next Decision Point. If you elect to stop the single-step trace at the Trace Decision Menu and return to Source View, press PF03/PF15.

Assume now that you elect Option 1, the TRUE condition in this execution path.

- 4 Select Option 1 and press Enter. The Source View pop-up displaying the Trace Decision Point ([Figure 124](#)) displays.

Figure 124 • Trace Decision Point

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEMO
Command ==>                               Scroll ==> CSR
ASG0456I DECISION: 339; 2 OPTIONS: 340, 343.
000331     MOVE ZIP-CODE TO HLD-ZIP.
000332     IF HLD-ZIP-PREFIX EQUAL CUR-PREFIX
000333         NEXT SENTENCE
000334     ELSE
000335         PERFORM P150-SUBTOT
000336             THRU P169-EXIT
000337         MOVE HLD-ZIP-PREFIX TO CUR-PREFIX.
000338
000339     IF LINE-CNT GREATER THAN 53                DECISION
000340         PERFORM P160-HDG                        OPTION 1
000341             THRU P169-EXIT.                    FALLTHRU
000342
000343     P110-CONTINUE-PRINT.                        OPTION 2
000344
000345     CALL 'DBAREAD2' USING DBA-DEPT-CODE.
000346
000347 * PRINT THE MASTER FILE DETAIL REPORT BODY FOR THIS MASTER
000348
000349     MOVE CLIENT-ID TO DET-NUMBER.

```

The trace continues until you reach the next Decision Point, another Execution Decision.

- 5 Select Option 1 and press Enter.

You can elect to suspend your trace and perform a Search for LINE-CNT. Once you have located the references to LINE-CNT, you can return to the point at which you suspended your trace by typing RTRACE in the primary command input area and pressing Enter.

[Figure 125](#) shows that a Viewing Decision is encountered at the Decision Point at line 340. The PERFORMed code is part of the execution sequence. If you elect Option 1, you choose not to look at the PERFORMed code (for example, this part of your program may contain a standard housekeeping routine which you do not need to review). If you elect Option 2, you display the PERFORMed source code.

Figure 125 • Trace Viewing Decision

```

File View Search Logic Task List Options Help
-----
Source View                                     Program: VIAIDEMO
Command ==>                                     Scroll ==> CSR
ASG0456I DECISION: 340; 2 OPTIONS: 343, 430.
000331     MOVE ZIP-CODE TO HLD-ZIP.
000332     IF HLD-ZIP-PREFIX EQUAL CUR-PREFIX
000333         NEXT SENTENCE
000334     ELSE
000335         PERFORM P150-SUBTOT
000336             THRU P169-EXIT
000337         MOVE HLD-ZIP-PREFIX TO CUR-PREFIX.
000338
000339         IF LINE-CNT GREATER THAN 53                FALLTHRU
000340             PERFORM P160-HDG                        DECISION
000341             THRU P169-EXIT.                          FALLTHRU
000342
000343 P110-CONTINUE-PRINT.                                OPTION 1
000344
000345     CALL 'DBAREAD2' USING DBA-DEPT-CODE.
000346
000347 * PRINT THE MASTER FILE DETAIL REPORT BODY FOR THIS MASTER
000348
000349     MOVE CLIENT-ID TO DET-NUMBER.

```

To display PERFORMed source code

- 1 Select Option 2 and press Enter. The Source View screen, shown in [Figure 126](#), displays.

Figure 126 • PERFORM Range Source Code

```

File View Search Logic Task List Options Help
-----
Source View                                     Program: VIAIDEMO
Command ==>                                     Scroll ==> CSR
ASG0318I RETURNING TO 343 FROM P160-HDG THRU P169-EXIT.
000428 P159-EXIT.
000429     EXIT.                                          RET/FALL
000430 P160-HDG.
000431     MOVE SPACES TO RPT-HDG-LINE1.
000432     MOVE CUR-PREFIX TO HDG-ZIP-PREFIX.
000433     MOVE PAGE-CNT TO MASTER-REPORT-PAGE-CNT.
000434     WRITE MAST-RPT FROM RPT-HDG-LINE1.
000435     WRITE MAST-RPT FROM RPT-HDG-LINE2.
000436     COMPUTE PAGE-CNT = (PAGE-CNT + 1).
000437     MOVE 4 TO LINE-CNT.                                FALLTHRU
000438
000439 P169-EXIT.
000440     EXIT.                                          STOP PNT
000441     SKIP3
000442 *****
000443 * PRINT THE GRAND TOTALS OF THE LOAN PORTFOLIO *
000444 *****
000445
000446 P170-FINAL.

```

- 2 Press PF08 to view the Stop Point encountered at line 440. At this point, you elect to stop and examine all of the statements that are part of your trace.

The Track is a series of scratchpad entries generated when you trace the execution path from the start point to the target(s). The Track contains all of the statements in the execution path chosen during a trace.

Each time you use single-step through program logic using Insight, a Track is generated automatically and replaces any already existing on the scratchpad. To save a Track, you must use the Options function and Copy feature to save it on the Scratchpad.

To view all of the statements on the current Track

- 1 Select Search ► Mark and press Enter.
- 2 On the Source View pop-up, shown in [Figure 127](#), type TRACK as the mark name and press Enter.

Figure 127 • Track of Execution Path Statements

File View Search Logic Task List Options Help		

Source View		18 STATEMENTS FOUND
Command ==>		Scroll ==> CSR
000329	P105-NOT-FIRST-TIME.	TRACK
000330		
000331	MOVE ZIP-CODE TO HLD-ZIP.	TRACK
000332	IF HLD-ZIP-PREFIX EQUAL CUR-PREFIX	TRACK
000333	NEXT SENTENCE	TRACK
000334	ELSE	
000335	PERFORM P150-SUBTOT	
000336	THRU P169-EXIT	
000337	MOVE HLD-ZIP-PREFIX TO CUR-PREFIX.	
000338		
000339	IF LINE-CNT GREATER THAN 53	TRACK
000340	PERFORM P160-HDG	TRACK
000341	THRU P169-EXIT.	FALLTHRU
000342		
000343	P110-CONTINUE-PRINT.	TRACK
000344		
000345	CALL 'DBAREAD2' USING DBA-DEPT-CODE.	TRACK
000346		
000347	* PRINT THE MASTER FILE DETAIL REPORT BODY FOR THIS MASTER	

To invoke the contents of a paragraph

Assume that you are interested in the contents of paragraph P155-CL-SUBTOT.

- 1 Select View ► Paragraph X-ref and press Enter.
- 2 Type P155-CL-SUBTOT as the target name, specify the target type, and label name, as shown in [Figure 128](#). Set the Direction option to previous to see how P155-CL-SUBTOT is invoked, and press Enter.

Figure 128 • View - Paragraph Cross-Reference

```

View - Paragraph Cross-Reference Request

To list transfers of control to or from paragraphs in the program,
type a target name and select a target type and direction. Then
press Enter. For a name selection list for a target type (other
than types 1 and 6), type a pattern (e.g. ABC*) in the target name
input field.

Target name  P155-CL-SUBTOT_____

Target type          Direction
7_ 1. None - use cursor 1 1. Previous
   2. Mark name          2. Next
   3. Perfrange name
   4. Program name
   5. Subset name
   6. Line range
   7. Label name

```

The results, shown in [Figure 129](#), reveal paragraphs that transfer control to P155-CL-SUBTOT as well as the type of transfers that are used in those paragraphs.

Figure 129 • Paragraph Cross-Reference Screen

```

View - Paragraph Cross Reference
Command ==> _____ Scroll ==> PAGE

Target(s): LABEL P155-CL-SUBTOT
Direction: PREVIOUS

A : Add to target      P : Execute PREF      S : Select for viewing

S  Comes from          How          Target paragraph(s)
-----
_ PROGRAM-INIT          PERFORM      P155-CL-SUBTOT
_ P150-SUBTOT            FALLTHRU      " "
***** BOTTOM OF DATA *****

```

Now, you can examine paragraph contents of P150-SUBTOT, which falls through to P155-CL-SUBTOT.

- 3 Type S to the left of P150-SUBTOT and press Enter. The source view shown in [Figure 130](#) displays.

Figure 130 • Paragraph P150-SUBTOT

```

File View Search Logic Task List Options Help
-----
Source View                                Program: VIAIDEMO
Command ===>                               Scroll ===> CSR

000420 P150-SUBTOT.
000421     MOVE ZIP-LOAN-CNT TO SUB-LOAN-CNT.
000422     MOVE ZIP-LOAN-AMT TO SUB-LOAN-AMT.
000423     MOVE ZIP-YTD-INT TO SUB-YTD-INT.
000424     WRITE MAST-RPT FROM SUB-PRINT.                                FALLTHRU
000425 P155-CL-SUBTOT.
000426     MOVE 0 TO SUB-LOAN-CNT, SUB-LOAN-AMT, SUB-YTD-INT.
000427     GO TO P159-EXIT.
000428 P159-EXIT.
000429     EXIT.                                                        RET/FALL
000430 P160-HDG.
000431     MOVE SPACES TO RPT-HDG-LINE1.
000432     MOVE CUR-PREFIX TO HDG-ZIP-PREFIX.
000433     MOVE PAGE-CNT TO MASTER-REPORT-PAGE-CNT.
000434     WRITE MAST-RPT FROM RPT-HDG-LINE1.
000435     WRITE MAST-RPT FROM RPT-HDG-LINE2.
000436     COMPUTE PAGE-CNT = (PAGE-CNT + 1).
000437     MOVE 4 TO LINE-CNT.                                            FALLTHRU
000438

```

The previous example can also be applied to quickly and accurately cross-reference any COBOL language subset. For example, you could perform a paragraph cross-reference on the INPUT subset name to reveal all paragraphs containing input statements and how they are reached. Using the technique demonstrated earlier in this chapter, in the section on Saving the Results of Analysis, you could print out the list of these paragraphs for future program walk-throughs.

Hint

You can examine program logic without designating a target. When you specify a direction with these functions on a pop-up, you get these results:

- FORWARD/NEXT follows program execution to locate the target(s) from the Start Point FORWARD to the program EXITS.
- BACKWARD/PREVIOUS follows program execution to locate the target(s) from the Start Point BACKWARD to the Procedure Division or Entry statement.

Summary: Conducting an Analysis of Program Logic

- You used Insight to look at the hierarchical structure of this program and to view the execution sequence from a compute statement backward to a target to determine how the value was set.
- You identified how MASTER-REPORT-DATE was populated and how it was modified after a CALL statement.
- You identified the execution path from the Procedure Division to the first READ statement, where a known bug existed in the initialization routine.
- You determined how LOAN-AMT is used in execution sequence after the READ statement.
- You determined how the SUBTOTAL parameter gets invoked.

Applying Quality Assurance and Standards

Code inspections are the primary means for ensuring adherence to programming quality standards. Assume that you are the moderator for the quality assurance walk-through before an actual inspection is conducted. Your department has new standards. Before you begin your quality assurance code inspection, you decide to record your analysis as a SCRIPT to run on several other programs in the Loan Processing Department. You recognize that using a SCRIPT against other programs online saves you time and increases your confidence in the results over manual inspection.

Saving an Analysis

If you want to exclude unwanted lines from the display, turn XMODE ON, as shown in ["Getting a Program Overview" on page 55](#).

To save the steps you perform during a Quality Assurance code inspection using the SCRIPT feature

- 1 Select Options ► Modes and press Enter to display the Options - Processing Modes pop-up shown in [Figure 131](#).

Figure 131 • Options - Processing Modes Pop-up

Options - Processing Modes		
Command ==> _____ Scroll ==> PAGE		
Type option settings. Then press PF3/15 (END) to save options and exit.		
Option	Set	Description
LEARN	OFF	Display internally generated Primary Commands
SCRIPT	OFF	Script facility is disabled
XMODE	ON	Exclude all lines before executing Primary Commands

- 2 Set SCRIPT mode ON on the Options - Set Processing Modes pop-up to save the steps in your quality assurance analysis. Press PF03/PF15.

You can use the SCRIPT feature on any analyzed program in the AKR.

- 3 When you have completed your analysis, repeat [step 1](#) and [step 2](#) and set SCRIPT mode OFF on the Options - Set Processing Modes pop-up. Press PF03/PF15.

To execute each command in order in a SCRIPT

- 1 Select File ► Execute script and press Enter. The File - Execute Script pop-up, shown in [Figure 132](#), displays.

Figure 132 • File - Execute Script File Pop-up

File - Execute Script	
Type a data set name, a data set name with a member name, or just a member name in parentheses. Select the "Single step" option if you wish to execute the script one command at a time.	
If you wish to "resume" normal execution of a "single step" script, select the "Resume automatic mode" option. If you wish to cancel a "single step" script, select the "Cancel execution" option. The "resume" and "cancel" options should be entered with a blank data set name field.	
Data set name	_____
Options	
1	1. Automatic
	2. Single step
	3. Resume automatic mode
	4. Cancel execution

- 2 Type USERID . INSXXX01 . VIASCRIP in the Data set name field, select the Single step option, and press Enter.

During execution of the script you can change a command, if desired, when it displays in the primary command input area.

- 3 To bypass a command, delete the contents of the primary command input area and press Enter.

IF and ELSE Statements

To determine if all IF statements are indented and aligned with their respective ELSE statements

- 1 Select Search ► Subset and press Enter.
- 2 Designate the Subset name, CONditionals, select no Options, as shown in [Figure 133](#), and press Enter.

Figure 133 • Search - COBOL Subset Pop-up

```

Search - Subset Name

Type a subset name and select search options. Then press Enter.
For a selection list, type a pattern (e.g. ABC*) in the name area.

Subset name  CONDitional

Direction      Options      Action
1  1. All       / IN-clause...  1  1. Find
   2. Next                               2. Highlight
   3. Previous                               3. Scroll
   4. First                                4. Print
   5. Last                                 5. Punch
                                           6. Exclude
  
```

As a result of this subset option, all statements or parts of statements that conditionally change the flow of control in a program, like IF, ELSE, and WHEN, for example, are highlighted.

The results in [Figure 134](#) show that all IF statements appear to be aligned with their respective ELSE statements. ELSE statements appear to be on separate statements by themselves. If you press PF08 to scroll down through this display, you see a nested IF-ELSE-IF structure in this program.

Figure 134 • Source View - Alignment of CONDitional Statement

File	View	Search	Logic	Task	List	Options	Help
Source View							17 STATEMENTS FOUND
Command ==>							SCROLL ==> CSR
***** TOP OF DATA *****							
000244			VARYING REC-CNT FROM 1 BY 1				243 LINES NOT DISPLAYED
000245			UNTIL END-INPUT.				CONDITNL
000255			IF DEBUG-PARM = 'TEST'				9 LINES NOT DISPLAYED
							CONDITNL
000299			IF DBA-DEPT-CODE > 24				43 LINES NOT DISPLAYED
							CONDITNL
000301			IF DBA-DEPT-CODE < 16				1 LINE NOT DISPLAYED
							CONDITNL
000332			IF HLD-ZIP-PREFIX EQUAL CUR-PREFIX				30 LINES NOT DISPLAYED
000333			NEXT SENTENCE				CONDITNL
000334			ELSE				CONDITNL
							4 LINES NOT DISPLAYED
000339			IF LINE-CNT GREATER THAN 53				CONDITNL
							60 LINES NOT DISPLAYED
000400			IF END-INPUT				CONDITNL
000401			NEXT SENTENCE				CONDITNL

To determine if negative expressions were used in IF statements

Assume that one of the quality assurance standards prescribes that negative expressions should not be used in IF statements.

- 1 Select Search ► String and press Enter.
- 2 Type NOT in the String field, with the IN-clause designated on the pop-up, as shown in [Figure 135](#), and press Enter.

Figure 135 • Search - Pattern Pop-up

Search - Pattern String

Type a string and select search options. Then press Enter.

String NOT

String type

1. Simple
2. Hexadecimal
3. Text
4. Picture

Location

1. Any
2. Word
3. Prefix
4. Suffix

Direction

1. All
2. Next
3. Previous
4. First
5. Last

Options

/ IN-clause...

Action

1. Find
2. Highlight
3. Scroll
4. Print
5. Punch
6. Exclude

Begin column ---

End column ---

On the IN-Clause Option pop-up, shown in [Figure 136](#), type CONDitionals as the subset name, and press Enter.

Figure 136 • IN-Clause Option Pop-up

```

                                IN-Clause Option

To restrict the source lines to be considered, type one or more
IN-Clause names. Then press Enter. For a selection list, type a
pattern in the appropriate name field.

Line range . . . -----
Subset name . . . CONDitional
Paragraph Name -----
Perfrange name -----
Program name . . -----
User MARK name -----

```

In this example, no negative IF statements were used in the program, as indicated by the short message, NO PATTERNS FOUND.

Paragraph Names and Numbering Schemes

To view the section and paragraph names and numbering scheme used in this program

Repeat these same steps to view paragraph names and numbering.

- 1 Select Search ► Subset and press Enter.
- 2 Specify SECTION + PARAGRAPH in the Subset name field, as shown in [Figure 137](#), and press Enter.

Figure 137 • Search - COBOL Subset Name Pop-up

```

                                Search - Subset Name

Type a subset name and select search options. Then press Enter.
For a selection list, type a pattern (e.g. ABC*) in the name area.

Subset name  SECTION + PARAGRAPH

Direction      Options      Action
1  1. All          - IN-clause...  1  1. Find
    2. Next                                     2. Highlight
    3. Previous                                     3. Scroll
    4. First                                           4. Print
    5. Last                                           5. Punch
                                                6. Exclude

```

The results, shown in [Figure 138](#), indicate that a unique, sequential numbering scheme was used and that all of the section names are meaningful to this program. To view the additional statements located in this Search, press PF08 to scroll down.

Figure 138 • Source View - Program Section Names

File	View	Search	Logic	Task	List	Options	Help

Source View					31 STATEMENTS FOUND		
Command ==>					Scroll ==> CSR		
***** TOP OF DATA *****							
000005	CONFIGURATION	SECTION.				4 LINES NOT DISPLAYED	SECTION
000008	INPUT-OUTPUT	SECTION.				2 LINES NOT DISPLAYED	SECTION
000013	FILE	SECTION.				4 LINES NOT DISPLAYED	SECTION
000052	WORKING-STORAGE	SECTION.				38 LINES NOT DISPLAYED	SECTION
000223	LINKAGE	SECTION.				170 LINES NOT DISPLAYED	SECTION
000253	PROGRAM-INIT.					29 LINES NOT DISPLAYED	PARAGRAPH
000279	P000-NEXT.					25 LINES NOT DISPLAYED	PARAGRAPH
000291	P000-EXIT.					11 LINES NOT DISPLAYED	PARAGRAPH
000298	P005-VAL-PARM.					6 LINES NOT DISPLAYED	PARAGRAPH

Verifying PERFORM Statement Standards

Assume that a quality assurance standard requires all PERFORM statements using the THRU clause to go to a program EXIT. In addition, coding standards require that PERFORM statements contain only one paragraph.

To determine if this program meets these criteria

- 1 Select List ► Perform and press Enter. The List - Perform Range Names pop-up, shown in [Figure 139](#), displays. There are two PERFORM labels that do not use the THRU clause, PROGRAM-INIT and P999-ABEND-PROGRAM.

Figure 139 • List - Perform Range Names Pop-up

```

                                List - Perform Range Names      10 PERFORM RANGES
Command ==> _____ Scroll ==> PAGE

Select the perform range to be viewed. Then press Enter.

Perform range name
-----
- PROGRAM-INIT
- P000-NEXT THRU P000-EXIT
- P005-VAL-PARM THRU P005-EXIT
- P010-OPEN THRU P019-EXIT
- P100-PRINT THRU P119-EXIT
- P120-READ THRU P129-EXIT
- P150-SUBTOT THRU P169-EXIT
- P155-CL-SUBTOT THRU P159-EXIT
- P160-HDG THRU P169-EXIT
- P999-ABEND-PROGRAM
***** BOTTOM OF DATA *****

```

- 2 Press PF03/PF15 to exit.

Useful Program Comments

Although the term useful is subjective, you may want to examine the program for comments that you believe are appropriate for long-term analysis and maintenance by those who may not be familiar with the source code.

To quickly isolate the comments in the program

- 1 Select Search ► Subset and press Enter.
- 2 Type COMMENTS + LABELS in the Subset name field, as shown in [Figure 140](#), and press Enter.

Figure 140 • Search - COBOL Subset Name Pop-up

```

                        Search - Subset Name

Type a subset name and select search options. Then press Enter.
For a selection list, type a pattern (e.g. ABC*) in the name area.

Subset name  COMMENTS + LABELS  _

Direction      Options      Action
1  1. All        - IN-clause...  1. Find
   2. Next                               2. Highlight
   3. Previous                               3. Scroll
   4. First                               4. Print
   5. Last                                5. Punch
                                           6. Exclude

```

Note:

You may want to also select the Print Action on the pop-up to provide you with a printed copy of these results for later reference during your analysis. See online help or ["Specifying Log/List/Punch Processing Options" on page 26](#).

This program contains 73 lines of comments and labels. Scroll through the results shown in [Figure 141](#). You can add and remove any of these comments.

Figure 141 • Source View - Program Comments and Labels

```

File View Search Logic Task List Options Help
-----
                        Source View                        73 LINES FOUND
Command ===> _____ Scroll ===> CSR

000001 IDENTIFICATION DIVISION.                                COMMENT
000002 PROGRAM-ID. VIAIDEMO.                                    COMMENT
000003 AUTHOR. WRITTEN BY ASG AT LANGLVL 2.                     COMMENT
- - - - - 2 LINES NOT DISPLAYED
000006 SOURCE-COMPUTER. IBM-370.                                COMMENT
000007 OBJECT-COMPUTER. IBM-370.                                COMMENT
- - - - - 223 LINES NOT DISPLAYED
000231 PROCEDURE DIVISION.                                     LABEL
000232
000233 ***** COMME
000234 *             PERFORM PROGRAM INITIALIZATION            * COMME
000235 ***** COMME
- - - - - 3 LINES NOT DISPLAYED
000239 ***** COMME
000240 *             DRIVER SUBROUTINE LOOP                    * COMME
000241 ***** COMME
- - - - - 11 LINES NOT DISPLAYED
000253 PROGRAM-INIT.                                           LABEL
- - - - - 21 LINES NOT DISPLAYED

```


Finding Dead Code or Dead Data in a Program

Using Insight, you can quickly locate all of the statements in a program that cannot be executed under any conditions. You can also identify all of the DATA DIVISION statements containing datanames and their aliases that are not referenced in the PROCEDURE DIVISION.

To locate all occurrences of dead code and dead data in the program and determine why they are dead

- 1 Select Search ► Subset and press Enter.
- 2 Type DEAD as the subset name, as shown in [Figure 142](#), and press Enter.

Figure 142 • Search - Subset Pop-up

Search - Subset Name

Type a subset name and select search options. Then press Enter.
For a selection list, type a pattern (e.g. ABC*) in the name area.

Subset name DEAD_

Direction	Options	Action
1 1. All	- IN-clause...	1. Find
2. Next		2. Highlight
3. Previous		3. Scroll
4. First		4. Print
5. Last		5. Punch
		6. Exclude

To isolate just the dead code in a program, Search the DEADCODE subset name. Use the DEADDATA subset name to identify just those DATA DIVISION statements containing datanames and their aliases that are not referenced in the PROCEDURE DIVISION.

The results, shown in [Figure 143 on page 126](#), reveal that 14 lines of dead code and dead data were located in the program. Before you make a recommendation to delete any of the statements that represent dead code or dead data, you should determine if they are used in any COPY statements. In general, use these simple guidelines to determine which dead code or data statements can safely be deleted:

- If the dead code or dead data are used in COPY statements, then do not delete it.
- If the dead code or dead data are not used in COPY statements, then the dead code and/or dead data can be safely deleted.

Upon examination of these results, you discover that there are no COPY statements that contain dead code or dead data.

Figure 143 • Source View - Dead Code and Dead Data in VIAIDEMO

File View Search Logic Task List Options Help									

Source View					14 LINES FOUND				
Command ==>					SCROLL ==> CSR				
000060	77	CHECK-CODE		PIC X VALUE '0'.		DEADDATA			
000061	01	AVG-AMT		PIC 9(8)V99 COMP.		DEADDATA			
000062	01	NEW-DATA-FLAGS.				DEADDATA			
000063	05	NEW-CUSTOMER-DATA		PIC 9(3).		DEADDATA			
000064	05	NEW-ACCOUNT-DATA		PIC 9(3).		DEADDATA			
000065	05	NEW-ACCOUNT-TYPE		PIC 9(3).		DEADDATA			
- - -	-	-	-	-	-	160 LINES NOT DISPLAYED			
000226	05	PARM-LENGTH		PIC 9(4) COMP.		DEADDATA			
- - -	-	-	-	-	-	244 LINES NOT DISPLAYED			
000471	P200	EXIT.				DEADCODE			
000472		EXIT.				DEADCODE			
- - -	-	-	-	-	-	5 LINES NOT DISPLAYED			
000478	P250	AVG-AMT.				DEADCODE			
000479		COMPUTE AVG-AMT = (ZIP-LOAN-AMT / ZIP-LOAN-CNT).				DEADCODE			
- - -	-	-	-	-	-	1 LINE NOT DISPLAYED			
000481	P259	AVG-EXIT.				DEADCODE			
000482		EXIT.				DEADCODE			
- - -	-	-	-	-	-	13 LINES NOT DISPLAYED			
000496		GOBACK.				DEADCODE			

MOVE CORRESPONDING Clauses

Assume that your quality assurance standards do not permit the use of the MOVE CORRESPONDING clause. The use of MOVE CORRESPONDING clauses can result in these actions:

- Generation of additional machine code that may require significant core memory.
- Masking of the identity of actual source and target fields being moved.
- Creation of duplicate datanames, since both the source and target names must be identical.

To identify MOVE CORRESPONDING clauses in this program

- 1 Select Search ► String and press Enter. The Search - Pattern String pop-up, shown in [Figure 144](#), displays.

Figure 144 • Search - Pattern String Pop-up

```

                                Search - Pattern String
                                Type a string and select search options. Then press Enter.

String _____

String type                      Location
1  1. Simple                     1  1. Any
   2. Hexadecimal                 2. Word
   3. Text                       3. Prefix
   4. Picture                     4. Suffix

Direction                       Options                      Action
1  1. All                        _ IN-clause...       1  1. Find
   2. Next                                     2. Highlight
   3. Previous                                     3. Scroll
   4. First                                     4. Print
   5. Last                                     5. Punch
                                           6. Exclude

Begin column ___      End column ___
  
```

- 2 Type CORRESPONDING as the string name, choose the IN-clause Option on the pop-up, and press Enter.
- 3 Type ASSignment as the subset name on the IN-Clause Option pop-up, as shown in [Figure 145](#).

Figure 145 • IN-Clause Option Pop-up

```

                                IN-Clause Option

                                To restrict the source lines to be considered, type one or more
                                IN-Clause names. Then press Enter. For a selection list, type a
                                pattern in the appropriate name field.

Line range . . . _____
Subset name . . . ASSignment_____
Paragraph Name _____
Perfrange name _____
Program name . . _____
User MARK name  _____
  
```

There are no MOVE CORRESPONDING clauses in this program, as shown in the short message area.

Determining the Number of EXITs Used in a Program

Assume that standards require that only one program exit is permitted.

To determine if this program meets your established standards criteria

- 1 Select Search ► Subset and press Enter. The Search - COBOL Subset Name pop-up, [Figure 146](#), displays.

Figure 146 • Search - COBOL Subset Name Pop-up

```

Search - Subset Name

Type a subset name and select search options. Then press Enter.
For a selection list, type a pattern (e.g. ABC*) in the name area.

Subset name  EXIT_

Direction      Options      Action
1  1. All        - IN-clause...  1. Find
2  2. Next                                     2. Highlight
3  3. Previous                                     3. Scroll
4  4. First                                      4. Print
5  5. Last                                      5. Punch
                                           6. Exclude
  
```

- 2 Type EXIT as the subset name and press Enter.

Note:

EXIT or PGMExit are COBOL subsets. They are statements containing a STOP, RUN, GOBACK, or EXIT PROGRAM verb as well as CALL statements that are indicated as NORET (non-returning).

The results, shown in [Figure 147](#) indicate two program EXITs, one to a GOBACK and the other to a CALLED program.

Figure 147 • Source View - Program EXITs

```

File View Search Logic Task List Options Help
-----
Source View                                2 STATEMENTS FOUND
Command ==>                               SCROLL ==> CSR
000251      GOBACK.                          PGM EXIT
- - - - -
- - - - - 242 LINES NOT DISPLAYED
000494      CALL 'ABENDPGM' USING ABEND-CODE. PGM EXIT
- - - - -
- - - - - 2 LINES NOT DISPLAYED
***** ***** BOTTOM OF DATA *****
  
```

Note:

The CALLED program was designated during the Program Analyze process as a program that does not return.

You can use the Scratchpad feature demonstrated in the section, Saving the Results of Analysis, earlier in this section, to save the results of this Search for later reference.

Identifying 88 Levels Used in a Program

Assume that you permit 88 levels in your programming standards to create a higher level value definition.

To determine how many and where the potential 88 levels exist

- 1 Select Search ► String and press Enter.
- 2 Type 88 in the String field, select the IN-clause Option, as shown in [Figure 148](#), and press Enter.

Figure 148 • Search - String Pop-up

Search - Pattern String

Type a string and select search options. Then press Enter.

String 88

<p>String type</p> <p>1 1. Simple</p> <p>2. Hexadecimal</p> <p>3. Text</p> <p>4. Picture</p>	<p>Location</p> <p>1 1. Any</p> <p>2. Word</p> <p>3. Prefix</p> <p>4. Suffix</p>	
<p>Direction</p> <p>1 1. All</p> <p>2. Next</p> <p>3. Previous</p> <p>4. First</p> <p>5. Last</p>	<p>Options</p> <p>/ IN-clause...</p>	<p>Action</p> <p>1 1. Find</p> <p>2. Highlight</p> <p>3. Scroll</p> <p>4. Print</p> <p>5. Punch</p> <p>6. Exclude</p>

Begin column ___ End column ___

- 3 Designate DEFinitions as the subset name and press Enter to see how and where the 88 levels are located in this program, as shown in [Figure 149](#).

Figure 149 • IN-Clause Option Pop-up

```

                                IN-Clause Option

To restrict the source lines to be considered, type one or more
IN-Clause names. Then press Enter. For a selection list, type a
pattern in the appropriate name field.

Line range . . . -----
Subset name . . . DEFINITIONS_
Paragraph Name -----
Perfrange name -----
Program name . . -----
User MARK name  -----
  
```

[Figure 150](#) reveals that only one 88 level is found. Using this 88 level permits you to define the value for END-INPUT for the entire program, VIAIDEMO.

Figure 150 • Source View - 88 Level Statement

```

File View Search Logic Task List Options Help
-----
Source View                                1 PATTERN FOUND
Command ==>                               SCROLL ==> CSR
000055      88  END-INPUT                     VALUE 'X'.      PATTERN
- - - - - - - - - - - - - - - - - - - - 441 LINES NOT DISPLAYED
***** ***** BOTTOM OF DATA *****
  
```

Identifying =, <, or > Expressions Used Instead of the Full Spelling in IF Statements

Your department prescribes that these arithmetic symbols should not be used in program code.

To determine if any arithmetic symbols exist

- 1 Select Search ► String and press Enter.
- 2 Specify the expression, =, <, or > as the String, select the IN-clause Option on the pop-up, and press Enter.

Repeat the same sequence shown in [Figure 151](#) for each expression, designated as the Target on the pop-up.

Figure 151 • Search - Pattern String Pop-up

```

                                Search - Pattern String

Type a string and select search options. Then press Enter.

String =_

String type                      Location
1  1. Simple                     1  1. Any
   2. Hexadecimal                2  2. Word
   3. Text                       3  3. Prefix
   4. Picture                    4  4. Suffix

Direction                       Options                      Action
1  1. All                        / IN-clause...       1  1. Find
   2. Next                                     2  2. Highlight
   3. Previous                                     3  3. Scroll
   4. First                                     4  4. Print
   5. Last                                     5  5. Punch
                                           6  6. Exclude

Begin column ___      End column ___

```

- 3 Specify CONditionals as the subset name, as shown in [Figure 152](#), and press Enter. This provides you with a list of all occurrences of the designated expression(s) used in IF statements in VIAIDEMO.

Figure 152 • Search - IN-Clause Option Pop-up

```

                                IN-Clause Option

To restrict the source lines to be considered, type one or more
IN-Clause names. Then press Enter. For a selection list, type a
pattern in the appropriate name field.

Line range . . . _____
Subset name . . . CONditional
Paragraph Name _____
Perfrange name _____
Program name . . _____
User MARK name _____

```

You obtain the results shown in [Figure 153](#) when you designate the = expression in the Search.

Figure 153 • Source View - "=" Expressions in VIAIDEMO

File	View	Search	Logic	Task	List	Options	Help

				Source View		2 PATTERNS FOUND	
Command ==>						SCROLL ==> CSR	
-----						254 LINES NOT DISPLAYED	
000255		IF	DEBUG-PARM = 'TEST'				PATTERN
-----						191 LINES NOT DISPLAYED	
000447		IF	FIRST-TIME = 'Y'				PATTERN
-----						49 LINES NOT DISPLAYED	
*****				BOTTOM OF DATA		*****	

You locate one pattern where the < expression is used in this program, as shown in [Figure 154](#).

Figure 154 • Source View - "<" Expressions in VIAIDEMO

File	View	Search	Logic	Task	List	Options	Help

				Source View		1 PATTERN FOUND	
Command ===>						SCROLL ===> CSR	
-----						195 LINES NOT DISPLAYED	
000301		IF	DBA-DEPT-CODE < 16				PATTERN
*****							BOTTOM OF DATA
*****							*****

One occurrence of the > expression is found in VIAIDEMO, as shown in [Figure 155](#).

Figure 155 • Source View - ">" Expressions in VIAIDEMO

File	View	Search	Logic	Task	List	Options	Help

				Source View		1 PATTERN FOUND	
Command ===>						SCROLL ===> CSR	
-----						197 LINES NOT DISPLAYED	
000299		IF	DBA-DEPT-CODE > 24				PATTERN
*****							BOTTOM OF DATA
*****							*****

Summary: Applying Quality Assurance Standards

- In this module, you were able to determine that all IF statements were indented and aligned with their respective ELSE statements and that ELSE statements were coded on lines by themselves.
- Negative expressions were not used in IF statements.
- Paragraph numbering, section numbering, and naming conventions were sequential and meaningful.
- Not all PERFORM statements used the THRU clause.
- The program may or may not need additional comments, based upon your own personal preference and standards.
- Dead data and dead code do not appear to be used in COPY statements in this program and may be deleted.
- 88 levels, the use of symbolic expressions (such as =, <, and >) and multiple WRITE statements to the same file are consistent with your new programming standards.

You can now execute this same analysis SCRIPT across other Loan Processing programs to validate your quality assurance standards.

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